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CHICAGO SHOW ISSUE

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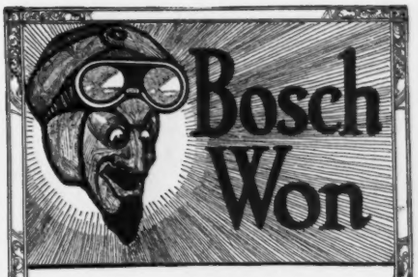

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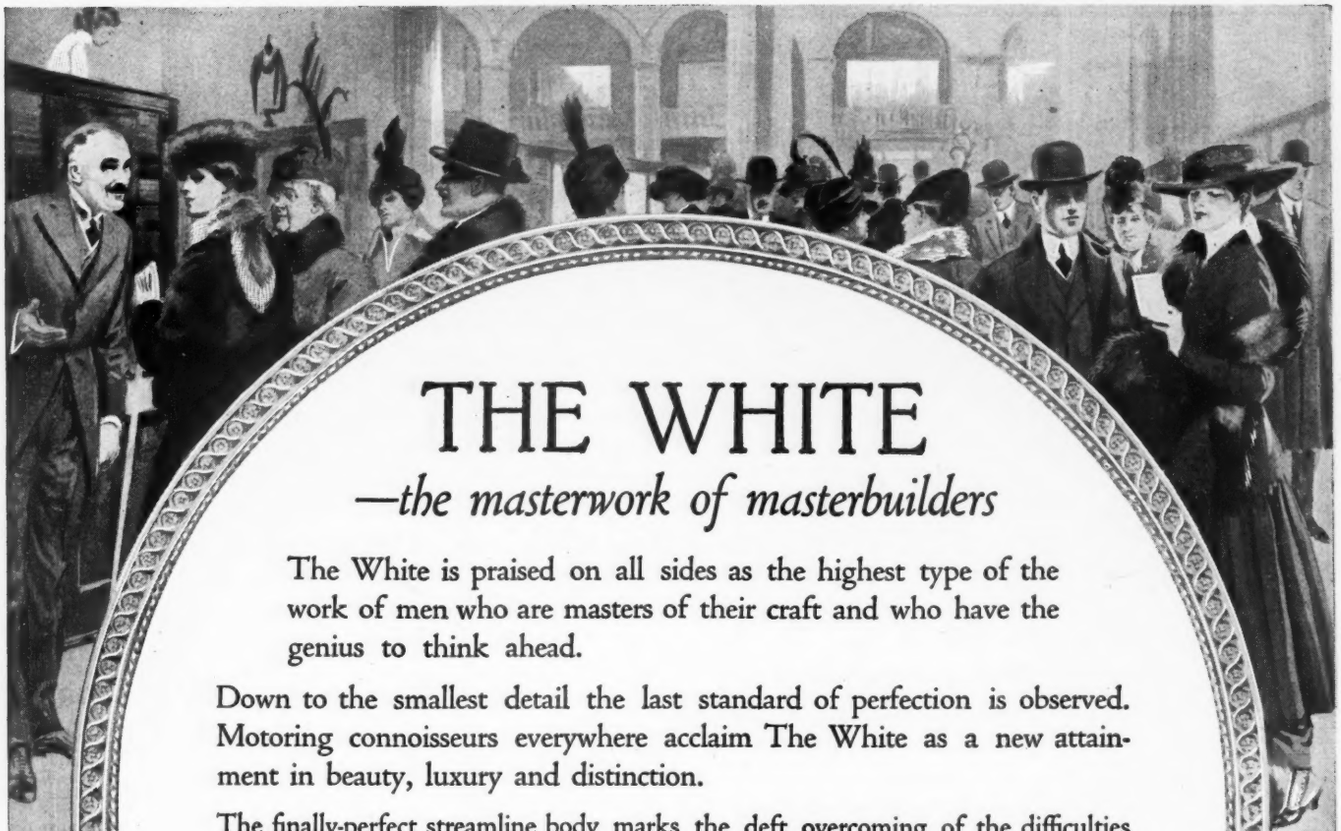

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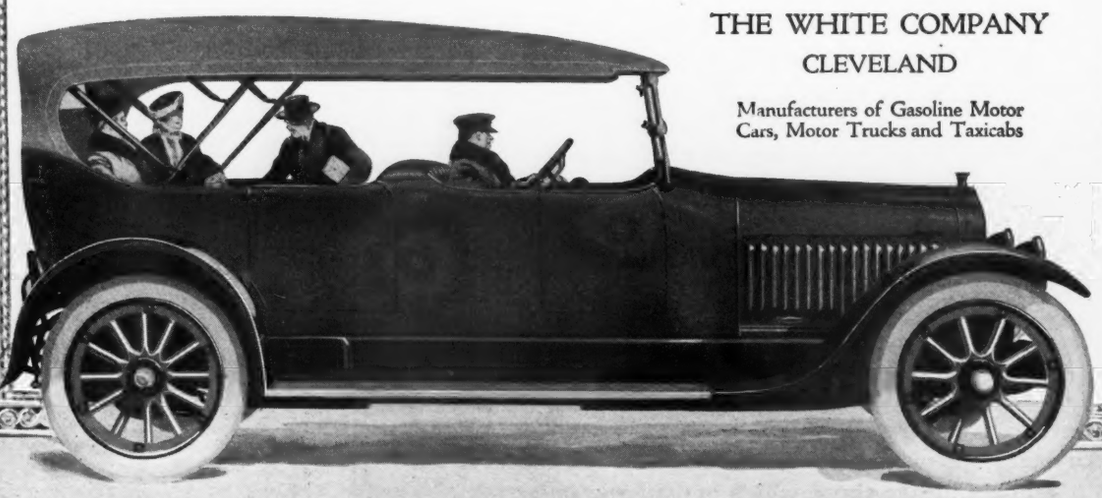


Vol. XXVII, No. 3 Chicago, January 21, 1915 $3.00 Per Year

MOTOR AGE

The Inexhaustible Cornucopia of Motoring Accessories

By J. C. Burton

BECAUSE fables, be they written by Aesop or Ade, carry the punch, the reader is requested to consider, at the outset, the remarkable facts embodied in

A FABLE

Once upon a time, there was a motor car owner who was regarded, and rightly, as a super-wonder in a community where he scarcely made himself heard with a bulb horn. When the side show proprietors heard of him, each offered him a fabulous sum to join an "astounding and augmented aggregation of famous, fancy and fascinating freaks." This owner never bought an accessory.

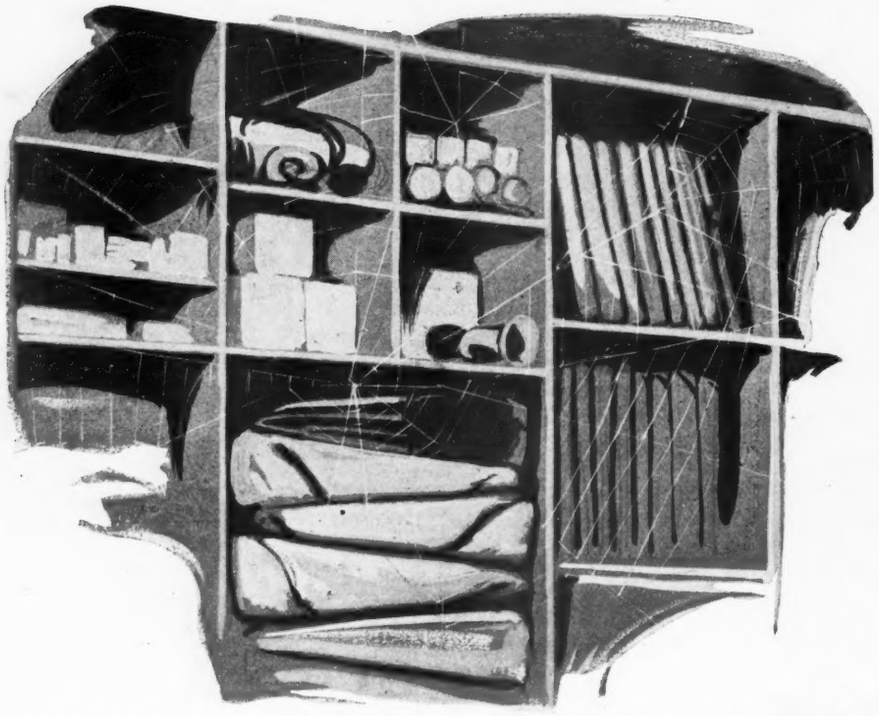
Moral: He was deaf, blind and totally devoid of pride.

No motor car, be its cost $500 or $5,000, ever reaches the ultimate consumer completely equipped. It may leave the factory in such a condition, but the first time that the new owner takes inventory of his purchase, he finds that it is lacking in several and varied essentials.

Such statements are not typed with the intention of challenging the honesty of the dealer or of intimating that the middleman is so base as to frisk the car of numerous sundries before disposing of it. Far from it. I merely aim to make a commentary on the frailty of human nature, a frailty that has been and is an important and sustaining factor in the development of the accessory business which, when measured by the capital invested, volume of sales made and dividends declared, is an offspring worthy of the parent that gave it birth, the motor car industry.

Introducing Expert Testimony

You, who own a motor car, will substantiate my contention that no machine is completely equipped when the purchaser takes possession of it, all claims of manufacturers, sincerely made in advertisements, to the contrary notwithstanding. Yours was not. You heard a horn that had a more commanding squawk than yours; you read of a carbureter which was guaranteed to give greater mileage per gallon of fuel than the gasoline gourmand with which your car was equipped; you saw electric headlights that illuminated more road than the modest gas lamps you carried; you tired of developing your muscles by cranking and investigated the practicality of self-starters; not being of Irish ancestry, you found it impossible to cup with your hands an ignited match



There are scores of accessories, which were in demand 5, 10, 15 years ago, now gathering dust on the shelves or in the bins for seldom-called-for things

on a windy day and were attracted to the window of a supply store by an electric cigar lighter that was on display there. You bought and bought freely. It was money judiciously expended for each purchase added either to your comfort or to the efficiency of your car. But the motive that prompted many of your expenditures was pride or vanity—there is very little distinction between the two—a desire to have just as good and completely equipped a car as any on the metropolitan boulevard or rural highway.

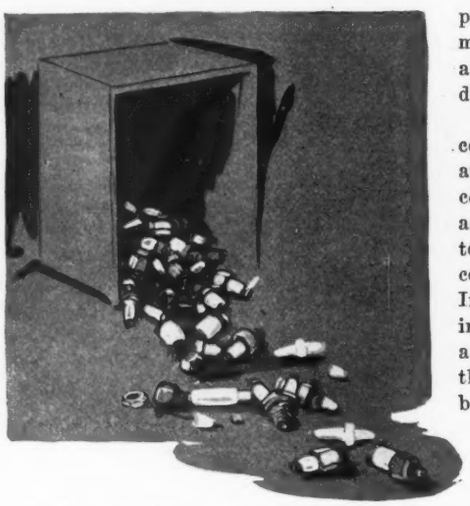
Because of this pride or vanity, common to all men who have money enough to purchase a motor car or sense enough to wish that they could afford to buy one, the market for the sale of accessories is practically unrestricted. There are few other businesses so pregnant with sales possibilities. Even the grocer, the butcher and the clothier, selling the very fundamental necessities of life, have good reason to look with envy upon the dealer in spark plugs and tires. Each of the 1,750,000 motorists in the United States, now paying tribute to the Standard Oil Co. or spending a king's fortune for the recharging of storage batteries, is a sure prospect for some one of the thousands of retailers carrying a stock of nonskid chains, vibrator horns, radiator covers, shock absorbers, motor-driven pumps, master vibrators and other popular and necessary sundries.

The Accessory Horn of Plenty

The demand for such articles of equipment is so great and so constant that the manufacture of accessories is one of the most profitable industries in the country today and the promise of a constantly growing market is so certain of fulfillment that plants are being built and equipped almost weekly for the production of essentials that increase the efficiency of the car and luxuries that add to the comfort of motoring. The distributor and dealer also have shared in the enormous profits accruing from the purchase of accessories by a host of buyers that in numbers exceed the population of Philadelphia by approximately 200,000.

A Task for a Dope Fiend

Definite statistics, could they be obtained, on the millions of dollars invested in the manufacture and merchandising of accessories probably would be so staggering as to be challenged as incredible. Even should I attempt to estimate the capital that has been put in the industry since its inception, I fear I might be accused of being an expert at cooking pills. It is best to leave such a task to the lotus-eater—and his figures will be no exaggeration—and be satisfied at hinting at the magnitude of this business.



In days of old the owner tried every make of spark plug and sometimes bought as many as 150 during a single season

By turning to the Automobile Trade Directory and glancing through the classified list of accessory makers, the inquisitive reader can secure a partial but not all-satisfying conception of the Brobdingnagian proportions of this industry which can boast of at least 100 $1,000,000 corporations. For example, there are registered in the red book of Motoria, 70 manufacturers of storage batteries, 82 of carbureters, 10 of tire chains, 15 of dash clocks, 17 of radiator covers, 5 of top curtains, 22 of headlight dimmers, 18 of tire pressure gauges, 22 of goggles, 8 of electric headlights, 13 of car heaters, 44 of tire holders, 29 of electric horns, 11 of mechancial horns, 24 of garage jacks, 33 of hand inspection lamps, 7 of cigar lighters, 16 of magnetos, 19 of rear view mirrors, 51 of gas economizers, 7 of radiator ornaments, 100 of spark plugs, 44 of motor-driven pumps, 11 of supplementary seats, 29 of shock-absorbers, 17 of speedometers, 40 of electric starters, 23 of electric lighting systems, 68 of pneumatic tires, 28 of trunks, 12 of wire wheels and 21 of tire cases—a grand total of 886 companies.

Tabulation Goal Unattainable

Allowances, of course, must be made for duplications, for the many manufacturers that make two or more different kinds of accessories. Just how much of a reduction should be made is problematical, but a guess of 25 per cent probably would not be far out of the way. There are the producers of greases and graphite, 137 of which are catalogued in the trade directory, and the refiners of gasoline and oils, an addition of 147 firms. There are scores of concerns, moreover, that have not been considered in the hasty poll—makers of motor coats and caps, fire extinguishers, car pennants, covers for bodies, seats, lamps and cranking handles, mechanical cleaners and compounds for windshields, puncture-proofing solutions, carbon removers, locking devices to prevent theft and scores of other accessories and sundries for which there is a demand.

In addition, there are the hundreds of companies manufacturing articles which are classified as parts rather than as accessories but which are sold to car owners as well as car makers—windshields, tops, tool kits, lamps and many other units commonly regarded as standard equipment. In fact, in the making of accessories, as in the making of laws, "there is no end" and one might as well attempt to count the leaves of the forest or the hairbreadth escapes of Kathlyn and Pauline of the serial films as to take a complete census of the manufacturers of equipment.

Tabulation carries us but a few parasangs on our interminable journey of estimation. A few specific figures, however,

may bring us closer to our unattainable goal. In one branch of the accessory industry, the manufacture of spark plugs, there are approximately 2,300 makes. To obtain trade names for them all was as much of a task as christening Pullman cars. The average annual business of each of the eight leading tire companies in the United States amounts to $20,000,000. At least $80,000,000 of this total sum of $160,000,000 comes out of the pocket of car owners, as about 50 per cent of the sales are made to the maker. On second thought, it appears that this $80,000,000 estimate is low for two of the eight companies seemingly prefer to deal with the individual motorist and are not prominent factors when original equipment bids are asked.

Others at Prosperity Table

Forget the fortunes invested in the manufacture of accessories and consider for a moment the distributors, jobbers and dealers. There are in the king row of distribution at least nine companies that, because of their enormous yearly sales, can look down upon the average wholesaler of the large city as did Gulliver upon the Lilliputians—such colossal concerns as Post & Lester, Hartford, Conn.; Motor Car Equipment Co., New York; Beckley-Ralston Co., Chicago; Fisk Co. of Texas, San Antonio; Elyea-Anstell Co., Atlanta, Ga.; Chanslor & Lyon Motor Supply Co., Los Angeles; E. A. Featherstone Co., Los Angeles; Weinstock-Nichols Co., San Francisco, and Ballou & Wright Co., Portland, Ore.

Next to sit at the prosperity table, set for the handlers of accessories, are the jobbers and manufacturers' agents. They are legion. You will find them scattered along the motor rows of the metropolises. In small cities of 15,000 population or more, the jobbing house in motor supplies is an institution as established as the postoffice or bank. Third in line are the retailers, serving the ultimate consumer direct. Their estimated number is 53,000, of which 50,000 are garage proprietors and the remainder tradesmen handling accessories exclusively.

But enough of numbers. You probably had more than your fill of figuring when the bills came in January 1.

The most wonderful commentary on the accessory business is not that it is an industry of great magnitude. It was forced to progress; it was forced to grow. The motor car industry, in its impetuous and phenomenal development, dragged it along and nourished it. What is more astounding is the fact that the sales of accessories have steadily increased—and not solely because more gasoline-driven vehicles are in operation each year—despite a form of competition offered by the motor car manufacturer who, in continually adding more and more equipment as stock, decreased and sometimes totally wiped out the demand for certain sundries that once were sold by the thousands to motorists.

At first reading, the foregoing paragraph may seem to be a jumble of contradictory statements, making specific citations necessary. The big jobbers tell me that they lose annually one or more big items, the sale of which showed an enormous profit on their ledgers. For example, before speedometers were made stock equipment, the Beckley-Ralston Co. of Chicago had a special wagon running daily between their establishment and the Stewart & Clark factory so great was the demand for mileage recorders. At the present time, one speedometer is sold where fifty were marketed 8 years ago, yet the sleep of the stockholders in the Chicago supply house is not disturbed by bankruptcy nightmares.

Sparkplugitis was a common and costly disease among the motorists who drove in the dawn of Motor's morning

Wanted: Horns and Tool Rolls

Incidentally, there are exceptions to the general rule that with the adoption of a certain accessory as stock, the sales of that article by the jobber and dealer are decreased. It is an almost incredible revelation that the Beckley-Ralston Co. sells many thousands of tool rolls annually and that its vibrator horn business amounts to more than $100,000 yearly. With the exception of the Fords, cars carrying bulb horns are relics, antiques, but it is not the Ford owners alone that are in the market for mechanical noise-producers. Pride and vanity influence these sales. The motorist, whose car already is equipped with a vibrator horn, hears an instrument with a louder screech and often buys that make. But can you explain the demand for tool rolls, knowing that there is not a car made that does not have a repair kit? I couldn't, so asked the man on the inside and he told me.

Before Makers Were Generous

"The tools listed as stock equipment often are inadequate," he said. "The owner finds this out in attempting to make a repair for which the factory did not provide a tool. Sometimes the owner supplements the outfit that came with the car by buying several additional tools, but more often he purchases an entirely new kit, junking the other in his garage."

If you seek a reason why this accessory or that accessory, which was in demand 5, 10, 15 years ago, now is gathering dust on the shelf or in the bin for seldom-called for things, trace the development of the motor car and the additions made to its standard equipment and you will have an explanation. In this day, when the common slogan of the makers is "More car for less money," it is difficult to conceive of a car that was sold without top, windshield, lamps, horn and speedometer. There was a time, however, less than a decade ago, when it lacked each and all of these modern essentials when it was delivered to the buyer.

Only as far back as 1907 the Buick Motor Co. created a sensation in the trade by announcing that in the future lamps would be made stock equipment on its cars and awarding a contract for $116,000 worth of darkness dissipators. Such beneficence was unprecedented. Should Theodore Roosevelt announce that "on and after this date I will refrain from voicing my opinions on all public questions" no greater astonishment would result. When other manufacturers followed the lead of the Buick, the accessories dealers had good reason to weep, for they lost the sale of an article that was in great demand. The average price paid for a lighting system was $90—$35 for a Prest-O-Lite tank and $55 for five lamps—and the number of motorists who replaced kerosene lamps with Carl Fisher's device for road illumination would have furnished Kaiser Wilhelm with enough troops to form a battalion.

About the same time as the more-equipment germ bit the Buick company, other manufacturers placed on their cars articles that previously had been listed as extras.

Tops, windshields and speedometers came gratis with the majority of machines sold in 1907 and the following year each asthmatic blast of the bulb horn did not recall to the mind of the owner how much he had paid for the instrument of pedestrian torture.

In the Days of Old

The Golden Age of the accessory business, as far as the small dealer was concerned, was previous to 1907. From 1900, when doleful skeptics far outnumbered the hopeful enthusiasts and four, six and eight cylinders were Chimerian dreams, to 1906, motor cars were mechanically inefficient and accessoriarilly (new word) impoverished, but human nature was the same as it is today and pride and vanity, a desire to make their machines more reliable and more comfortable, prompted motorists to spend fabulous sums for equipment.

In the infancy of the accessory business the sale of spark plugs and coils resulted in the playing of profitable tunes on the cash registers of many supply houses. The owner tried every make of plug and sometimes bought as many as 150 during a single season, although some of the plugs that he discarded as faulty were identical in construction with those that are sold and give satisfactory service today. The motorist of 15 years ago, tinkering with a new toy about which he knew little, usually blamed the spark plugs when his car wheezed and balked. Such condemnation usually was undeserved, improper adjustment of the coil points and the needle valve on the carbureter, water in the gasoline or weak batteries being the cause of mechanical trouble in ninety-nine out of every 100 instances. But the motorist demanded new spark plugs and the accessory dealer was glad to sell them to him. Sparkplugitis was a common and costly disease among the owners who drove in the dawn of Motor's morning.

Drive chains were another accessory in great demand in the days of old and the two-cylinder Oldsmobile. If the dealers in motor supplies today depended on the profits from the sale of drive chains to keep the wolf from the door, undertakers would be making a special rate for them. There are few cars nowadays that call for this article so prominent in the stock of accessory tradesman 15 years ago.

Then there was the collapsible water bucket, a necessary piece of equipment in the early days of motoring when failure to regulate the throttle in climbing hills and poor fan mechanism resulted in the radiator attempting to imitate a geyser. To make a trip of any distance without a collapsible water bucket under the seat was to tempt fate and to anticipate exercise for the leg muscles. The motorist of 10 years ago no more thought of venturing forth without such an accessory than the driver of the present would attempt a transcontinental trip without a spare tire strapped to the running board of his car.

Early Tire Troubles Profitable

The pioneer accessory dealer did a bigger business in tires than the proprietor of the present-day supply store if you qualify such a statement by taking into consideration the difference in number of cars in operation in 1900 and 1915. There were two reasons for this: First, the owner did not know how to care for his casings and second, the tire makers had not established branches at that time and did not sell direct to the retail buyer.

As motoring became more widespread, car owners stormed the accessory stores for gasoline hydrometers, a sundry about as popular with the motorist of 1915 as is the Federal league with organized baseball. Except in a few isolated instances, they never got value received for the money expended, for the average owner did not know how to use the instrument after he had bought it, making no deductions for temperatures and percentages and consequently not knowing whether he had a good or poor grade of fuel.

Motorists of the early days dressed the part and consequently motor clothing was an important line in the accessory dealer's stock. Goggles were sold by the thousands, enough to mask the features of all the surviving inhabitants of stricken Belgium. "By their goggles ye shall know them" was a common paraphrase of the biblical sentence as applied to the boulevard braggarts of a decade ago. They were a necessary article since the cars had no windshields to protect the driver's eyes.

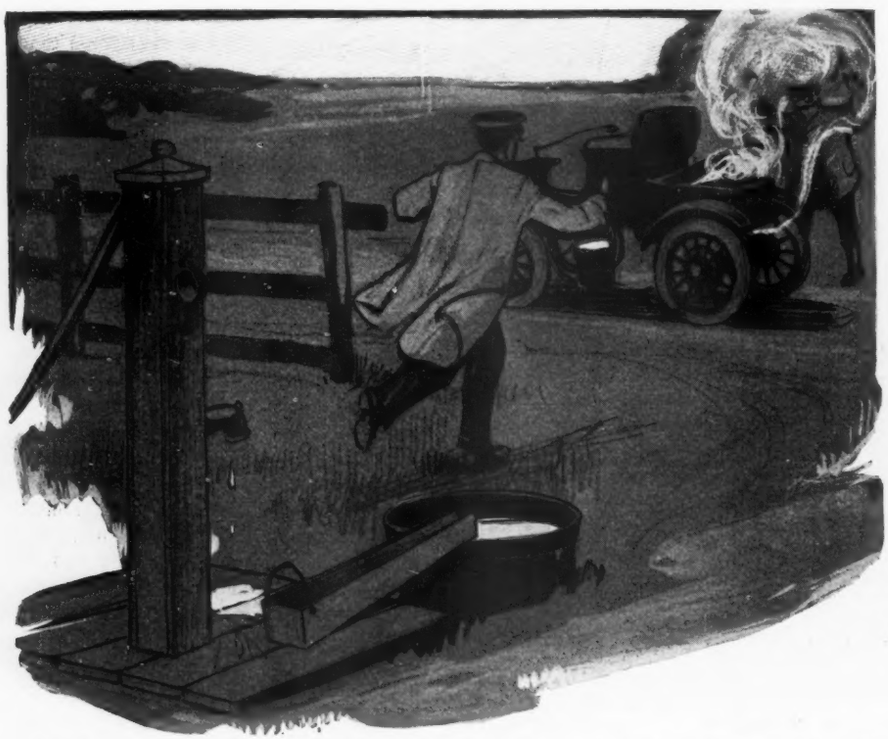
Since windshields and tops were not a part of the standard equipment at that time, the purchase of coats and caps was almost imperative. The thirty-third degree motorist invested in a duster, a driving coat and caps for winter and summer wear. Of the latter, which were made in various and fantastic shapes, there were at least seventy-five different styles ranging from an Eton to a Mexican toreador, a hat of either leather or silk with a broad brim and pointed crown and selling for $5. When worn by the motoring Don Jose, the Carmen of Fifth avenue or Michigan boulevard could not resist him.

According to one veteran dealer in accessories, F. E. Sparks, he bought more caps in 1903 from one firm than that company sells to all the merchants in Chicago at the present time. In the days when an invitation to ride in a horseless carriage was an epochal event in a man's life, Sparks sometimes ordered caps in lots of 175 dozen.

Capes for the Motor Car

Because the early models had neither tops nor windshields, the car owner was forced to invest in these accessories or purchase an expansive rubber cape which covered the driver, the passengers and the mechanism. These capes were made with two headholes, for use with roadsters, and four and five headholes to cover the occupants of touring cars. Another protection against inclement weather was a short leather coat, similar to that worn by the motorcyclist. This garment made a great hit with the motoring 400 and was an expensive piece of equipment, costing $25 or $30.

Perhaps the most revolutionary accessory put on the market during the era of the one-lungers was the tire chain, first



The motorist of 10 years ago no more thought of venturing out without a collapsible water bucket than the driver of the present day would attempt a transcontinental trip without a spare tire strapped to the running board of his car

made by the Weed company in 1903. Before it was manufactured, rain was one of the greatest menaces known to motoring. A spring shower of 2 or 3 hours' duration resulted inevitably in the postponement of reliability runs, the participants refusing to take chances on the slippery highways with poorly balanced cars equipped with smooth tread tires. At that time there was only one non-skid casing made.

Tires Insured to Make Sale

From the first time it was put on the market until the present day, the Weed chain, it is claimed, has been the largest selling accessory in the business outside of tires, the receipts from its sale amounting to millions of dollars annually. Like all new inventions, it was regarded with skepticism at first. Charles Knisely, a veteran among Chicago's motorists and for many years captain of the Chicago Athletic Association team in reliability contests with the Chicago Automobile Club, was the first man in Chicago to purchase a set and he refused to equip his car with them unless the agent guaranteed to replace his tires if, after a week's trial, the casings showed cuts or bruises resulting from the use of chains.

The accessories of 10 years ago—the windshields, the tops, the lamps, the speedometers—are modern essentials on the completely equipped car of 1915 and the accessory dealer, too wise to cry over spilled milk, is pulling the udders of other cows. The milk will be spilled again. The best selling articles of today—power tire pumps, shock absorbers and master vibraster coils—probably will be standard equipment on the cars of tomorrow and the retailer then must be on the lookout for other kinds.

The accessory dealer, in fact, is running an endless race with the motor car manufacturer, a race in which the former is always making the pace, a race in which he loses lap after lap and then spurts to the front again to regain them. Sisyphus, doomed by the gods to roll a boulder up a mountainside only to see it roll down again, never faced as hopeless a task. There was always a chance that the boulder might stick. There isn't the remotest possibility that the majority of certain accessories, the sales of which adds thousands of dollars to the profits of the big dealers, will not be adopted eventually as standard equipment by the leading car makers.

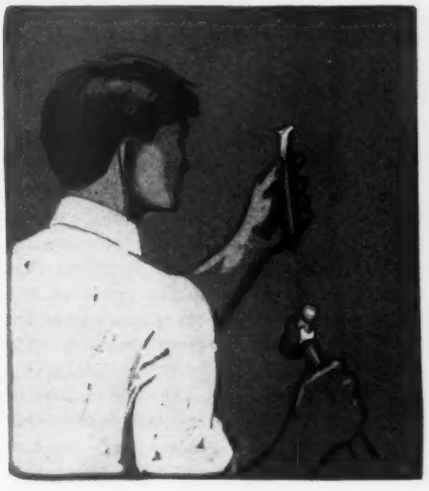
As long as motor cars are driven, however, there will always be a market for accessories. The demand for fitments will increase in proportion to the number of cars in operation. New devices, to add to the mechanical efficiency or the individual comfort, will be invented and manufactured. Neither will human nature change with the years. The same motives, the same desires which prompt the purchase of extra equipment in 1915, will be in evidence in 1920, in 1950, in 2000.

It is one of the unexplained paradoxes of the accessory business that Detroit, the hub of the motor car industry, does not hold the same enviable position in the manufacture of equipment. Most of the factories in which accessories are made are located in Ohio, where more tires are moulded annually than in all the other states in the union combined, and in cities of New England and the North Atlantic territory. The east cannot boast of being the distributing center, however. It could have made such a claim, and justly, 5 years ago when cars were more costly and moneyed men of the east were the biggest buyers and the most promising prospects. But the motor car sales, like the course of empire and the center of population, wended their way westward and the middle west, with a great farming population attracted to a popular-priced machine, became the big market for the maker of gasoline-driven vehicles. And where the demand for motor cars is greatest, there you will find the greatest demand for accessories. Consequently the east, where the majority of accessories are manufactured, now looks to the middle west to purchase the greater part of its output.

Tires Lead the Field

To attempt to rank accessories according to the quantity sold is a task for which the only rewards are a challenge and a dispute, but I am courageous enough to make such a ranking, basing it on the estimates of men who ought to know. Without considering those articles which are regarded as common stock equipment, the seven leaders are: First, tires; second, tire chains; third, spark plugs; fourth, vibrator horns; fifth, shock absorbers, in the manufacture of which there has been a great increase in the number of makers during the past year; sixth, master vibrator coils; and seventh, motor-driven pumps.

In my investigation of the accessory business, I attempted to make another classification and found myself stymied.



Why is there such a demand for tool rolls when every car leaves the factory so equipped? Because the tools listed as stock equipment very often are inadequate to make all repairs, and the owner, having discovered this, purchases a new kit

Motorists in the early days dressed the part—a short leather coat, similar to that now worn by motorcyclists, making a great hit with the motoring 400

"What are the percentage of sales of luxuries and necessities?" I asked several jobbers and dealers. "What do you mean, necessities and luxuries?" they fired back at me, forcing me to be more specific and explain where I made a distinction.

"Necessities," I replied, "are articles that add to the efficiency of the car or lower the cost of operation—tire chains and shock absorbers, for example. On the other hand, among the luxuries I class dash clocks. They are not essential. Every man who can afford a motor car has a watch, unless he has pawned it to buy gasoline or pay the garage bill."

One distributor finally consented to volunteer the information.

"About 75 per cent of the accessories manufactured are necessities and 25 per cent luxuries and the sales of the 75 per cent amount to about 85 per cent of the total. But don't think that the money spent for luxuries is a sum to be sniffed at. We sold $10,000 worth of dash clocks alone last year."

At all events, motor car accessories, like the poor, will be with us always. When they stop making them, when they stop selling them, the millenium will have arrived and the screech of motor horns will drown out the blast of Gabriel's trumpet.

Detroit Claims Leadership in Accessory Field

Michigan Metropolis Pre-Eminent in Manufacture of Sundries and Parts

DETROIT, Mich., Jan. 18—Detroit today claims to be the foremost city of the world in the manufacture of parts and accessories for motor cars. This is but a natural result of the city's pre-eminence in the building of motor cars which has created the demand for these products. Closeness to their principal market, unsurpassed transportation facilities and the city's many industrial advantages make Detroit the logical center for the large parts or accessory maker, not only because he is close to the factories of the city but because the balance of the big motor car plants of the country are not very far away.

Specialists in nearly every branch of the industry therefore have planted their factories here, and on account of the fertile soil have grown to be leaders in their lines. Among the parts and accessory products made in enormous quantities are motors, axles, electrical devices, gearsets, steering gears, bodies, tops, windshields, horns, springs, wheels, sheet metal parts, spark plugs, motor car hardware, mufflers, carbureters, radiators, lamps, bearings and nearly every other conceivable thing which goes into the car in manufactured form.

It is a simple matter for the concern which assembles its cars to draw from the supplies of the city for the entire construction almost without paying freight on a single thing. There is perhaps no other city in the world of which this may be said, not only in connection with the making of motor cars but on any other machinery or built-up device.

Early Days in Detroit

The history of Detroit's parts and accessory business dates back to the early days of the industry. One or two of the big makers of today were incorporated as far back as 1899, but the business of supplying car makers did not assume any great proportions until there were some quantity car makers to supply. Statistics show that the first year in which the production of cars was important in Detroit was 1905 when about 10,000 were turned out. This year and those immediately following and preceding it were correspondingly the big years in the number of parts and accessory makers incorporated or organized to do business.

Intelligent business men who could foresee the great things ahead of the motor car began to get together and form concerns which later have made it possible for car builders to offer cars at the astonishingly low prices today asked, because the parts makers have so grown into enormous industrial institutions that they are able to furnish their products to the motor car factories at strikingly low quantity production figures.

In Detroit today there are upward of thirty makers whose products are known the motor world over. It is interesting to note that although many millions are involved in the business today, only one of the concerns started with a capitalization of $1,000,000. This was the Timken-Detroit Axle Co., which was incorporated in 1909 under Ohio laws. Today it has $13,000,000 of capital stock and a corresponding three-fold increase in total floor space area has taken place. Originally a large concern with 100,000 square feet of factory, it today has 300,000 square feet, and employes 1,200 to 1,500 men when running to full capacity. The first year about 500 men were given employment.

Big Capital Involved

At the present time the Continental Motor Mfg. Co., the Northway Motor Mfg. Co., the Detroit Lubricator Co., the Fisher Body Co., the Kelsey Wheel Co., the McCord Mfg. Co., and Morgan & Wright have this much or more capital involved, while a number of others are close onto a million. Many of these had very humble beginnings and not very long ago either as Father Time would reckon it. In its brief growing period of from 7 to 10 years, each has had a brilliant career.

Though there are a number of plants which are the only ones of their line of great size in the city, there are some lines in which a number are successful. For instance, Morgan & Wright, one of the largest of the exclusive tire-producing institutions of the world, is the only tire plant here, while there are several great body makers, several in the carbureter group, a number in the motor group, a little clan of radiator makers and another making axles. The Kelsey Wheel Co. is the city's supreme and only producer of size of wheels and rims, just as the Gemmer Mfg. Co. is the largest producer of steering gears for the trade in the city.

As a class, the motor makers and the body builders are the big ones. The Continental Motor Mfg. Co. has had an interesting history. Starting in 1903, it was incorporated a year later with $6,000 capital stock and a little plant of 1,000 square feet. It gave employment to twenty-five men and built about eighty motors that first year, or fewer than two per week. As the demand increased the plant was added to and finally the present quarters with 350,000 square feet were built. Continental has $2,500,000 capital today, and with 2,500 to 3,000 men in its two plants turns out about 25,000 engines of all types a year. The other plant is in Muskegon, Mich., and its proportion of these figures is 1,000 men and 10,000 engines.

Northway was started a year after Continental and its beginnings were a little more auspicious for $30,000 of the present million of capital stock was established. The first year's output was seventy-five motors, but now in a splendid big plant of 800,000 square feet some 25,000 motors are yearly built for a representative list of patrons.

The Golden, Belknap & Swartz Co. was organized in 1910 with a capital of $100,000. It has doubled its original floor space of 9,000 square feet since then, and from a working force of thirty men, has increased to 120 with a stepping-up of production from some 500 motors the first year to 5,000 at present. The Massnick-Phipps Mfg. Co., parts maker, which was organized in 1909 did not start to make motors until 1913. Its capital has grown from $10,000 to $50,000 and empoys from thirty to 150. The Sterling Motor Co. is the latest of the group, having begun in 1912 in a 20,000 square foot plant to build seven or eight engines a day with sixty men. Now the space is three times as great, 300 men are employed and about twenty-five motors are built each day.

In the body-making group, the Fisher Body Co., takes the lead. This concern, with the Fisher Closed Body Co., and the Fisher Body Co., of Canada, Ltd., is the largest body-building organization in the world. Owned and directed by the same officers and directors, the Fisher companies have grown from a 10,000 output the first year to the enormous production of 135,000 bodies annually at the present time.

The Fisher Body Co. was organized in 1909 with $50,000 capital stock; today $1,600,000 is invested. The closed body part was begun in 1911 with a capital stock then of $125,000 which has since been raised to half a million. The first year Fisher had a floor area of 15,000 square feet, and today this is 575,000. In 1909, 200 men were given employment, while the maximum number employed now is 1,681. This does not include the Fisher Closed Body Co., which has a separate plant with 375,000 square feet of space and with a pay roll of 1,410 men as a maximum, and this as compared with the 450 employed at first. The Canadian company is across the river from Detroit, and has 350 men.

Hayes and Wilson Companies

The Hayes Mfg. Co. and the C. R. Wilson Body Co. are also big factors in the body group. Each is at present capitalized at three-quarters of a million. Hayes was begun in 1903, while Wilson started in 1899. Hayes had originally $20,000 capital and the plant covered 5,000 square feet. It was in 1910 and 1911 that the plant was specially increased until now there are 225,000 square feet. The first year the Hayes pay roll showed twelve men, but now there are 1,400 looking to it for their livelihood. Specific figures on Wilson are not available, but the plant is today one of the large institutions of the city.

The Herbert Mfg. Co. also was started in 1899 with an original capital stock of $100,000 which has since been raised to $300,000. The first year 110 men made ten bodies a day, while now 650 men are engaged to make an average of 223 a day. The present floor space is 141,000 square feet. Other body makers are the Briggs Mfg. Co., with $50,000 capital, and the Griswold Motor and Body Co. with $20,000.

The Radiator Group

In the radiator group we have the McCord Mfg. Co., which does not confine its entire attention to this specialty, however. Gaskets, stampings and other parts are also made. The concern was organized in 1909 and it started with 40,000 square feet in its plant. In this same year 55,000 square feet was added, with the result that today some 150,000 square feet are included. The working force in 1909 was 250 men; today this is doubled. The present radiator output is 300 per day, with an occasional rise to 400 per day when the demand is heavy.

The Long Mfg. Co., the present radiator capacity of which is 500 per day, was started in Chicago in 1901 and moved to Detroit in 1910. Originally having a $15,000 capital stock, it today has $400,000. The employes have increased from twenty-five to 275, and the present floor area is 75,000 square feet.

The National Can Co., which was started in 1901, began the making of radiators in 1912. Its capital stock is $250,000, and while 150 men found employment there the first year, the number now is 500. The Briscoe Mfg. Co., which was begun in 1901 as an independent concern, later became a part of the United States Motor Co., and now is subsidiary to the Maxwell Motor Co. It has a capital of $310,000 and makes about 200 radiators per day.

In the carbureter field, Holley Bros. is the largest in the city. Its present output from a 30,000 square foot plant is 1,000 per day. Business was begun by the Holleys in Bradford, Pa., in 1898, and they moved to Detroit in 1903. At that time $20,000 was involved, but at present $150,000 is the capitalization. Fifteen carbureters a day were made at first, and it took twenty men to do it. Now 230 men are employed.

The Zenith Carbureter Co. brought the French carbureter of this name to Detroit in 1911 and started making it in a space of 8,000 square feet. Later a modern factory building was constructed which has 20,000 square feet.

The Detroit Lubricator Co., which was organized here in 1877, is one of the city's old-established factories, which has been closely connected with the motor industry only in recent years. Lubricating devices and carbureters are the motor car products.

The Gemmer Mfg. Co., which makes steering gears exclusively, was organized in 1907 with $200,000 capital; this had been increased to $300,000 and with an original pay roll of thirty-five men, has grown until 350 men are now required.

Making Presed Steel Frames

Pressed steel frames to the tune of 40,000 a year are now turned out by the Detroit Pressed Steel Co., which started in 1909 with a production of 500 for the year. The plant then had 6,000 square feet of space to its credit; while at present it boasts of 49,000 square feet. The employes have grown from fifty to 275.

The Vanguard Mfg. Co. makes windshields to the value of $500,000 a year at this time, while it started in with an output valued at one-tenth of this amount. The present capitalization is $100,000 or four times the original. Between 125 and 155 men are now employed as against the original number of twenty-five.

The Morgan & Wright concern was organized to make tires back in 1883, and came to Detroit in 1905, with its plant put in actual operation a year later. The original capital stock of $100,000 has been swelled to $5,000,000 and the original number of employes here was 700; today there are 3,000. The daily production is about 2,500 tires.

The Spark Plug Representation

The Jeffery-Dewitt Co. is one of the world's largest producers of spark plug porcelains. Two hundred thousand a month are now turned out in a plant of 30,000 square feet with 400 men. This company was organized in California in 1906 and located in Detroit in 1910. Its original capital was $25,000, and it is now $500,000. The Champion Spark Plug Co., Toledo, last year purchased a controlling interest in this concern.

The Edmunds & Jones Mfg. Co., which specializes on motor car lamps started in business in 1904 with a small capital of $12,500. It today has an investment of $500,000 and has grown from a business doing $2,500 worth to one with a monthly output of $100,000. The floor space was originally 5,000 square feet but today it measures 150,000. Thirty men were at first employed and over ten times that many are now on the pay roll.

Another big company is the Bowel Roller Bearing Co. which was organized originally at Dayton, O., in 1907, but moved to Detroit in 1911. This company had five men to pay at first, but now its pay checks number 200. Its floor area today is 28,000 square feet and its capitalization $225,000.

Chicago Well Located As Accessory Selling Center

More Than 100 Makers in the Windy City

CHICAGO, Jan. 20—Without a rival when measured by the quantity and value of articles distributed and in the front rank among cities where motor car equipment is produced, Chicago can look back upon 1914 as the most prosperous year in the history of the accessory business and makers and dealers are prophecying an even greater volume of sales during 1915.

Chicago serves the richest and largest market for accessories in the country, the great middle west, where bumper crops have been harvested and the average farmer is a motorist. The heavy demand for motor car fitments, especially from the agricultural sections,, has made it imperative for the local distributer, jobber and manufacturer's agent to carry a larger stock than similar tradesmen in the other metropolitan centers of the United States. And the demand is not confined to buyers close at home. The small-town motorist of Iowa, for example, buys in Chicago instead of sending to Des Moines or Sioux City for supplies and sundries. To serve such an expansive market, excellent railroad facilities are necessary and these Chicago has, thus insuring direct and immediate shipment of accessories from the big supply houses.

Chicago's manufacturers of accessories number more than 100, among the more prominent and largest of which are the following companies: Stewart-Warner Speedometer Corp., speedometers, clocks, vacuum feed tanks and motor-driven pumps; Stromberg Motor Devices Co., carbureters; Findeisen & Kropf Mfg. Co., Rayfield carbureters; Dann Spring Insert Co., spring inserts; Randall Insert Co., spring inserts; Triple Action Spring Co., Johnson shock absorbers and springs; Mayo Mfg. Co., spark plug tire pumps; the Van-Sicklen Co., of Aurora, Ill., air speedometers; American Electric Co., electric horns; Twitchell Gauge Co., tire pressure gauges; Vesta Accumulator Co., electric ignition and lighting systems; Tuthill Spring Co., springs; Sunderland Mfg. Co., hand tire pumps; Universal Rim Co., demountable rims and Stone shock absorbers; Mogul Starter Co., mechanical cranker for Ford cars; Gardner Engine Starter Co., mechanical cranker; Triple Tread Tire Co., recovers for casings; F. A. Hardy & Co., goggles; Ideal Sheet Metal Works, radiators, tanks, fenders and hoods; Lucas Electrical Device Co., battery indicators; the Buda Co., of Harvey, Ill., motors; Auto Sheet Metal Works, Ford bodies and metal dashes; Apex Electrical Mfg. Co., motor-driven pumps; One-Man Top Co., Ford tops; Mathieson Spring Wheel Co., spring wheels; Adams & Westlake Co., Adlake lighting systems; Ahlberg Bearing Co., bearings; American Steel and Wire Co., wire wheels; Atlas Auto Supply Co., Tire-Doh puncture proofing solution; John

W. Blackledge Mfg. Co., Velvet shock absorbers; Cochran Pipe Works Mfg. Co., wrenches and oil gauges; Ellsworth & Cross, demountable wheels; Fowler Lamp and Mfg. Co., lamps and specialties; Garden City Spring Co., springs; William Grus, Jr., & Co., spring leaf lubricator; Imperial Brass Mfg. Co., brass accessories; Jones Electric Starter Co., Jesco starting and lighting systems; Peerless Accessory Mfg. Co., Peerless four-cylinder tire pump; and the Searchlight Co., Searchlight gas.

Among the accessory distributors located here is the Beckley-Ralston Co., generally acknowledged to be among the largest supply houses in the country and doing an annual business totaling millions of dollars. In addition to this colossus of the industry, there are several other big jobbers in equipment along Chicago's motor row —the Auto Parts Co., whose 1914 sales were more than $500,000; the local branch of the Johns-Manville company; the Electric Appliance Co.; the Chicago Auto Supply House; the Fulton-McCutchan Co., and Erwin Greer & Co., handling a special line of Ford accessories and maintaining an establishment for the storing of such equipment separate from its Ford salesrooms.

In addition to these large jobbers, there are between fifty and sixty manufacturer's agents in the city, all of whom shared in the prosperity enjoyed by the accessory industry during the year past and which anticipate much in 1915.

Boston Strong Factor as Handler of Accessories

More Than 200 Concerns Now Doing Business in Hub

BOSTON, Mass., Jan. 16—From one company registered in the Boston directory under the head of "Motor Car Fittings," in 1899, to nearly 200 firms listed as "Motor Car Supplies" in 1915, tell in brief the story of the growth of the accessory business in this city during the past 15 years. It makes interesting reading to go back through the years to learn what developed to keep pace with the motor industry.

Until 1899 there were no firms listed dealing with motor car supplies. The first one was the Imperial company and it advertised a crank hanger. The year following another firm was added, the American Roller Bearing Co., which made bearings for axles. Oils were taken up in 1901 but there was only one firm advertising, the Webster Oil and Gasoline Co. In 3 years one firm had been added each year. There was no addition in 1902, but in 1903 Joseph Palmer, who had been making springs for railroad cars, fire engines and other vehicles, blossomed out as a maker of motor car springs. That same year the Dow Portable Electric Co. was added with its spark plugs, coils and batteries.

Awakening in 1904

So for 5 years the industry was not awakening to the realities of the future as far as the motor business was concerned. Yet in that time the cars were beginning to increase and there were a number of manufacturers in New England. The Bay state had been busy making tools for the motor makers, however. In 1904 the awakening began. Then there was added more firms with supplies than in the entire 5 years preceding. Motor car baskets were listed. Lanterns were placed on the market. A special motor car grease was advertised. The oil dealers were increased to three, and Lewis & Matthews advertised "the oldest and finest garage in Boston," on Stanhope street.

In 1905 there was another gain, and then there appeared regular houses handling accessories, firms that were big enough to be listed in a metropolitan directory. Some men were selling things in a small way among their friends. In that year there was listed such things as the Anderson spark plug, the Jones speedometer, and some of the tire companies were opening their own branches in Boston. In addition to what has been mentioned one finds such specialties added to the trade as motor car cements, houses, polishes, soaps, plugs, patches, tire protectors.

The trade was developing then and along Columbus avenue and in the vicinity of Park square there were several firms. Others were located on Boylston street and other down town streets. But the places were not large and showy. One had to delve about seeking things. Each year showed that there was some new genius devising a thing that would fit into the trade, and so in 1906 there were listed as additional specialties motor car castings, fire extinguishers, hampers, trunks, headlights, searchlights, hoods, mud guards, packing, tanks. That is a rather representative list.

In the next year there were added bodies, tops, driving chains, monograms, oilers, and in 1908 the generators and shock absorbers were listed. Some of them were being used, but they had not reached the dignity of being worth mentioning in the trade section of the directory. In that year there were then listed fifty-two motor car supply houses, or a gain of fifty-one in just 10 years.

The accessory business had then assumed formidable proportions. The makers were on the market with such things as the Kilgore and Flentje shock absorbers made in Boston; the Hoffecker speedometer had been devised; the Chelsea clocks were being fitted to cars; Gray & Davis were doing a fine lamp business, and a few other specialties of well known make were being produced.

In looking over the names of the supply houses of that year one finds many that are well known now and others that have dropped out. Albert Champion had a place here, but he is now in the west. William Connell is still doing an accessory business, but he is also one of the firm of Connell & McKone, which has the big Overland distribution in eastern Massachusetts. J. M. Linscott was another, and now he is the big Reo dealer for New England. Harry Eisner sold supplies and developed a magneto. The Bi-Motor Equipment Co. has grown to be one of the largest in the country. Iver Johnson's is a big sporting goods house carrying a line of high-grade accessories. Post & Lester joined the throng and are still at it. George H. Proctor has changed to selling motor cars. The Angier company has retired from business and some of the other concerns of that time found the strife too much.

Those were the days when a man bought a car and he got really nothing but the chassis and the body. When it came time to go out for a drive he had to go around here and there to get a top, speedometer, horn, and such things as that. The result was that the accessory men who were able to produce things at short notice and had arrangements so that they could equip a car without keeping it a week were doing a good business. Then came the change in the manufacturers' methods brought about by the maker of accessories getting the motor car men to add tops as part of a regular car. That was hailed with delight by motorists. It did not bother the accessory men a great deal. But when speedometers were added, then horns, and so on until today the car is completely equipped it marked the beginning of a decline in the accessory business, or rather a diminution of the number of firms engaged for a while.

Interest Is Aroused

However, there were too many things the motorists needed, and not all the makers were drawn into the full-equipment class at once. So the strong firms weathered the fluctuation. Then when the cars began to run into the 25,000 and creep up to double that number the need of accessory houses was more apparent. So they came back stronger than ever. In the past few years more minds have been turned into the inventive channels and so one finds added to the list such things as motor car employment agencies, starters, dynamos, plating, enameling, radiators, schools, closing, turntables, top fabrics, windshelds, horns, etc., that were not mentioned in the directories previous to 1908.

Today there is in Boston a newly formed accessory association that is working for harmony. Its officers intend to put an end to price-cutting.

Hartford Home of Prominent Makers of Sundries

Accessory Business Interests Many Concerns There

HARTFORD, Conn., Jan. 8—Although engaged in the manufacture of motor cars long before Michigan and Indiana could boast of being the leaders in the production of self-propelled vehicles, Connecticut has been lapped many times in the strenuous race in which the middle-western states lead and now is centering its energies on the making of accessories and parts.

"We inhabitants of the Nutmeg state are specializers, not assemblers," said H. P. Maxim of silencer fame, and this explains why Connecticut has lost prominence as a motor car manufacturing center but at the same time has gained fame as a producer of motor car equipment.

In Hartford there are several large concerns. The Hartford Machine Screw Co. is an old and successful concern. It is sponsor for the Master spark plug and the Hartford power tire pump.

Then there is the Whitney Mfg. Co. It has expanded from time to time and is officered by a live organization. Motor car chains and machinery are manufactured, and many Whitney chains are doing duty on American trucks in the war zone in Europe at the present time.

The Billings & Spencer Co. is another successful concern founded by old-time Yankee genius. Every motorist knows the B & S triangle trade mark. Most of the product goes to the middle west, of course. All sizes of forgings are made, also complete drop presses.

The Hartford Rubber Works Co. was always a factor in the trade. Eventually it was taken over by the United States Tire Co. Just now the shop is rushing orders out.

The Hartford Auto Parts Co. makes fittings for motor cars and most of them go to the middle west. Business is good. The concern is moving to the lower floor of the Colt's west armory to secure more space. The Maxim Silent Fire Arms Co. is making silencers for several of the middle western builders while Kinsler & Bennett is furnishing universal joints and other fittings to the middle western car makers.

The Bush Mfg. Co. is founded by men who were formerly with the Whitlock Coil Pipe Co., a pioneer maker of radiators. The concern is doing a very satisfactory business. The Veeder Mfg. Co. not only makes recording devices of various types but also specializes on die castings. The Post & Lester Co., while not a direct manufacturer, does a big business in accessories, and the J. N. Macdonald Co. manufactures a line of special chain pliers.

At Bristol is located the New Departure Mfg. Co. The present business of the concern is the making of ball bearings. The company took over the plant of the Whitlock Coil Pipe Co., at Elmwood, which suggests a fall by the way side. It is not so very long ago that most radiators were of Whitlock make.

In Meriden there is the Connecticut Telephone and Electric Co., which makes a fine line of electrical equipment and in New Haven there is Mayo of radiator distinction. Mayo himself was once a Whitlock attache.

DETROIT ENFORCING TRAFFIC LAW

Detroit, Mich., Jan. 14—The chief of the traffic department is of the opinion that since the new ordinance which prohibits cars from remaining more than 30 minutes at curbs in the business section of the city, has been enforced, conditions have improved 50 per cent.

"We are not enforcing the regulation to the letter and allow cars to remain 1 hour standing, but no sensible motorist can object to our intention of changing the practice of many who leave their cars 3, 4 and even 5 hours in front of their offices. In fact, we have evidence of several who parked their cars about 7:30 or 8 a. m. and took a street car to Toledo, returning after 7 p. m., when they would take their cars and drive away. With the ever increasing number of cars traffic conditions are becoming such that the owners should co-operate heartily with the police in bringing about relief, but instead some do all they can to the contrary."

Judge Phelan in the recorder's court has announced that he will fine heavily all motorists against whom complaint is made a second time by the police.

ADAMSON MEASURE ENDORSED

Washington, D. C., Jan. 18—Congress now will be asked by motor car users to pass the Adamson measure. The American Automobile Association has taken the matter in hand, and President John A. Wilson will confer with Representative William C. Adamson, of Georgia, chairman of the committee on interstate and foreign commerce, and the author of a measure concisely set forth in the following extract:

"No person who shall have qualified by complying with the laws and regulations of the state, territory, or district of his residence to use and operate such vehicle or vehicles shall be required in any other state or territory or district in to which he may go for business or pleasure to make any additional registration or take out any additional license in order to use and operate any such machine."

For some time the Adamson measure has rested in committee awaiting a decision by the United States supreme court on what has been known as the Maryland case, wherein a resident of the District of Columbia contended that he had the same right as any other vehicle owner to the use of Maryland roads as long as he had provided himself with an identification number from his home district, and thus made it possible to apprehend him in case he violated any of the highway laws of the commonwealth.

But in the decision rendered by the highest court in the land, written by Justice McReynolds and concurred in by all the justices, it is held that in the absence of a national law a state has a perfect right to enact whatever laws it may see fit in relation to the motor car. Furthermore Justice McReynolds holds that "the movement of motor vehicles over the highways is attended by constant and serious danger to the public, and is also abnormally destructive to the highway itself." Further on the justice states: "In the absence of national legislation covering the subject, a state may rightfully prescribe uniform regulations necessary for public safety and order in respect to the operation upon its highways of all motor vehicles—those moving in interstate commerce as well as others."

ILLINOIS HAS 131,140 CARS

Springfield, Ill., Jan. 16—If every state in the union were to show the increase in motor car licenses which is recorded by the state of Illinois, the manufacturers would wear the smile that don't come off. By figures which have just been compiled by experts in the office of the secretary of state, it is shown that there were 131,140 car licenses issued in the year ending December 31, 1914. The business did not stop at the first of December, either, for the last of the licenses were issued on December 31. Chauffeurs also came in for their share of the increase, as there were 18,000 licenses granted drivers in the course of the year.

Here is the table showing the increase of 1914 over 1913, as regards licenses granted by the state of Illinois:

Licenses	1913	1914	Increase Per Cent
Motor cars	94,656	131,140	.385
Chauffeurs	14,000	18,000	.444
Motorcycles	12,000	14,800	.40

Although the first month of the year 1915 has only run about half of its course, there have already been over 20,000 motor car licenses issued, the 20,000th license having been passed Friday morning, January 15. Clerks in the department are almost 1 week behind in filling license applications now and it is necessary to work nights in order to keep from falling farther behind in this work.

The state of Illinois has made preparations for licensing 166,000 cars this year and from indications this amount may be exceeded. Numbers for 1915 are blue on an orange background.

Newest Cars and Latest Accessories To Vie for Honors

CHICAGO, Jan. 18—Samuel A. Miles, about the only impresario in captivity that does not dress the fur-collared-overcoat part in winter, has made the big jump from New York to Chicago and on Saturday of this week will stage in this city his annual revnue, "The Motor Cars of 1915," which had such a successful run in the eastern metropolis at the commencement of the new year. The present production, the most stupendous in Miles' career of successful motor show promotion, will hold the boards here for 7 days, there being no Sunday performances, the final curtain being scheduled to drop January 29.

As in previous years, the show is of such magnitude that it has been necessary to lease three of the largest exhibition buildings in Chicago—the Coliseum, the Coliseum Annex and the First Regiment Armory—in order to stage it properly.

The Coliseum, where Diavolo looped the loop, Roosevelt felt the pressure of the G. O. P. steam roller and Frank Gotch applied the toe-hold to ambitious aspirants to the title of world's wrestling champion, has been the scene of many spectacles in days gone by but none the equal of that which is to be shown there Saturday and 6 days of next week, for the Chicago motor show of 1915 promises to eclipse the fourteen exhibitions of a similar nature held in this city.

Sharing with the latest creations of the motor car engineers and designers the honors of the show will be the accessories. In fact, they will be in the front row of the chorus. One hundred and forty-one manufacturers of equipment, forty-seven of which did not have space at the Grand Central Palace, will exhibit their products here. Although the New York show generally attracts more makers of parts and fitments than the local salon, this year almost establishes an exception to the general rule. The accessories shown here will be legion and will run the alphabetical gamut from accelerators to wrenches.

The exhibits have been assigned to the following spaces: gasoline passenger cars on the main floor of the Coliseum, the Annex and the Armory, and in the basement of the Coliseum; accessories in the Coliseum balcony and basement, Armory gallery and second floor of the Annex; and electric passenger cars along the center aisle of the main floor of the Armory. There will be no truck display. Every inch of floor space has been sold and the disappointed applicants for space total more than one hundred.

Almost all the members of the original New York cast will take part in the Chicago production since the following makes of cars, which made their premier appearance before Father Knickerbocker, will be displayed here as well: Allen, Apperson, Argo electric, Auburn, Baker electric, Briggs-Detroiter, Briscoe, Buick, Cadillac,

Directory of Accessory Exhibits

COLISEUM AND ANNEX.

Location	Name of Exhibitor and Address	Product
Ann. Gal.	Ajax Trunk and Sample Case Co., New York	Trunks and baggage carriers
Col. Gal.	American Bronze Co., Berwyn, Pa.	Non-Gran bearing bronze
Ann. Gal.	American Taximeter Co., New York	Popp and Jones Taximeters
Col. Gal.	Apple Electric Co., Dayton, Ohio	Electrical equipment
Ann. Gal.	N. B. Arnold, Brooklyn, N. Y.	Paints, polishes and cleaners
Ann. Gal.	Ashland Mfg. Co., Ashland, Ohio	Eureka tire and garbage jacks
Col. Gal.	Atwater Kent Mfg. Works, Philadelphia, Pa.	Electrical equipment
Ann. Gal.	Auto Rescue Mfg. Co., Streator, Ill.	Repair devices
Basement	American Die and Tool Co., Reading Pa.	Gears and transmissions
Ann. Gal.	B. and L. Auto Lamp Co., New York	Lamps
Col. Gal.	Badger Brass Mfg. Co., Kenosha, Wis.	Solar lamps
Col. Gal.	Benford Mfg. Co., Mt. Vernon, N. Y.	Monarch spark plugs
Ann. Gal.	Benjamin Electric Mfg. Co., Chicago	Electric horns
Col. Gal.	J. W. Blackledge Mfg. Co., Chicago	Velvet Shock absorbers
Ann. Gal.	Bock Bearing Co., Toledo, Ohio	Roller bearings
Ann. Gal.	Braender Rubber and Tire Co., Rutherford, N. J.	Braender Bull Dog tires
Ann. Gal.	Brown Co., Syracuse, N. Y.	Spark plug tire pumps
Col. Gal.	Brown-Lipe-Chapin Co., Syracuse, N. Y.	Transmissions and differentials
Col. Gal.	Brown Trafilog Co., Cleveland, Ohio	Oil boxes for lubricating springs
Col. Gal.	Buda Co., Harvey, Ill.	Buda motors
Col. Gal.	Byrne, Kingston & Co., Kokomo, Ind.	Kingston carbureters
Col. Gal.	F. S. Carr Co., Boston, Mass.	Fabrics for tops and seat covers
Ann. Gal.	Champion Ignition Co., Flint, Mich.	Spark plugs
Ann. Gal.	Champion Spark Plug Co., Toledo, Ohio	Champion spark plugs
Ann. Gal.	Cleveland Worm and Gear Co., Cleveland Ohio	Worm gears
Col. Gal.	Continental Motor Mfg. Co., Detroit, Mich.	Continental motors
Col. Gal.	C. Cowles & Co., New Haven, Conn.	Forgings, mountings, trimmings
Col. Gal.	William Cramp & Sons, Philadelphia, Pa.	Worm gears and bronzes
Ann. Gal.	Smalley Daniels, Detroit, Mich.	General supplies
Ann. Gal.	Dann Oil Cushion Spring Insert Co., Chicago	Dann oil insert
Basement	Day Tire Protector Co., Chicago	Tire protectors
Col. Gal.	Detroit Lubricator Co., Detroit, Mich.	Force feed oilers
Col. Gal.	Joseph Dixon Crucible Co., Jersey City, N. J.	Graphites
Col. Gal.	Doehler Die Casting Co., Brooklyn, N. Y.	Bears and die castings
Col. Gal.	Double Fabric Tire Co., Auburn, Ind.	Reliners and inner tubes
Ann. Gal.	Dreadnaught Tire and Rubber Co., Baltimore, Md.	Pneumatic tires
Col. Gal.	John L. C. Dykes, Chicago	Specialties
Col. Gal.	Dyneto Electric Co., Syracuse, N. Y.	Electric starting and lighting systems
Basement	Disco Electric Starter Co., Detroit, Mich.	Electric cranking systems
Ann. Gal.	S. Edelman & Co., Chicago	Specialties
Col. Gal.	Edison Storage Battery Co., East Orange, N. J.	Batteries and lamps
Col. Gal.	Electric Storage Battery Co., Philadelphia, Pa.	Batteries
Col. Gal.	Findelsen and Kropf Mfg. Co., Chicago	Rayfield carbureters
Ann. Gal.	Frazer Lubricator Co., Chicago	Lubricants
Basement	Fritz Carburetor Co.	
Ann. Gal.	Fulton-McCutchan Co., Chicago	General supplies
Col. Gal.	Gabriel Horn Mfg. Co., Cleveland, Ohio	Gabriel horns
Col. Gal.	Garage Equipment Mfg. Co., Milwaukee, Wis.	Parts, accessories, specialties
Col. Gal.	Garford Mfg. Co., Elyria, Ohio	Horns and speedometers
Col. Gal.	Globe Machine Stamping Co., Cleveland, Ohio	Stampings and specialties
Ann. Gal.	Globe Rubber Tire Mfg. Co., Trenton, N. J.	Globe tires
Ann. Gal.	Golde-Patent Mfg. Co., New York	Tops
Col. Gal.	Gould Storage Battery Co., New York	Batteries
Col. Gal.	Gray & Davis, Inc., Boston, Mass.	Starting and lighting systems
Ann. Gal.	L. P. Halladay Co., Streator, Ill.	Ford specialties
Col. Gal.	A. W. Harris Oil Co., Providence, R. I.	Oils and greases
Col. Gal.	Hartford Suspension Co., Jersey City, N. J.	Shock absorbers and bumpers
Ann. Gal.	Robert H. Hassler, Indianapolis, Ind.	Shock absorbers
Col. Gal.	Hayes Mfg. Co., Detroit, Mich.	Bodies and tool boxes
Col. Gal.	Heinze Electric Co., Lowell, Mass.	Heco spark plugs and magnetos
Basement	Hickmyer Reflector Co., Toledo, Ohio	Headlight dimming device
Col. Gal.	Hoffecker Co., Boston, Mass.	Speedometers
Basement	Hunter Auto Supply Co., Chicago	
Col. Gal.	Hydraulic Pressed Steel Co., Cleveland, Ohio	Frames
Col. Gal.	Imperial Brass Mfg. Co., Chicago	Brass specialties
Basement	Interstate Electric Novelty Co., Chicago	Trouble lamps and flashlights
Col. Gal.	J. M. Shock Absorber Co., Philadelphia, Pa.	Shock Absorbers
Ann. Gal.	K-W Ignition Co., Cleveland, Ohio	Electrical equipment
Basement	K and W Rubber Co., Ashland, Ohio	Maxotires
Col. Gal.	Kellogg Mfg. Co., Rochester, N. Y.	Mechanical starters and pumps
Ann. Gal.	Kemco Electric Mfg. Co., Cleveland, Ohio	Generators and horns
Ann. Gal.	Leather Tire Goods Co., Niagara Falls, N. Y.	Tire protectors and treads
Basement	Leece-Neville Co., Cleveland, Ohio	Starting systems
Ann. Gal.	Lipman Air Appliance Co., Beloit, Wis.	Motor-driven tire pumps
Col. Gal.	Lovell-McConnell Mfg. Co., Newark, N. J.	Klaxon horns
Basement	Master Carburetor Corp., Detroit, Mich.	Master carbureters
Ann. Gal.	Mayo Mfg. Co., Chicago	Spark plug tire pumps
Ann. Gal.	McQuay-Norris Mfg. Co., St. Louis, Mo.	Piston rings
Ann. Gal.	Metal Stamping Co., Long Island City, N. Y.	
Ann. Gal.	Charles E. Miller, Anderson, Ind.	Anderson tires
Ann. Gal.	Morrison-Ricker Mfg. Co., Grinnell, Iowa	Grinnell gloves
Col. Gal.	A. R. Mosier & Co., Mt. Vernon, N. Y.	Spark plugs
Ann. Gal.	Frank Mossberg Co., Attleboro, Mass.	Wrenches and sockets
Ann. Gal.	Motometer Co., Inc., New York	Motometers
Col. Gal.	Motsinger Devices Mfg. Co., LaFayette, Ind.	Motsinger carbureters
Basement	W. H. Mullins Co., Salem, Ohio	
Col. Gal.	National Coil Co., Lansing, Mich.	Ignition apparatus
Ann. Gal.	New York Coil Co., New York	Ignition apparatus
Col. Gal.	New York and New Jersey Lubricant Co., New York	Lubricants
Ann. Gal.	Paul G. Niehoff & Co., Chicago	Accessories
Col. Gal.	North East Electric Co., Rochester, N. Y.	Starting and lighting systems
Basement	Northern Engineering Works, Detroit, Mich.	Starters, etc.
Col. Gal.	Pantasote Co., New York	Fabrics for tops and cushions
Ann. Gal.	Perkins-Campbell Co., Cincinnati, Ohio	General supplies
Basement	Philadelphia Storage Battery Co., Philadelphia	Batteries
Ann. Gal.	Pierce Speed Controller Co., Anderson, Ind.	Speed controllers

at Annual Chicago Motor Show That Opens Saturday

DIRECTORY OF ACCESSORY EXHIBITS—Continued

Location	Name of Exhibitor and Address	Product
Ann. Gal.	Pittsburgh Model Engine Co., Peru, Ind.	Motors
Ann. Gal.	Platt and Washburn Refining Co., New York	Veedol oils
Ann. Gal.	William R. Pratt Mfg. Co., Chicago	Bumpers, etc.
Ann. Gal.	Pyrene Mfg. Co., New York	Fire extinguishers
Col. Gal.	Randall-Fauchney Co., Boston, Mass.	Jericho horns
Col. Gal.	Remy Electric Co., Anderson, Ind.	Electrical apparatus
Col. Gal.	Rose Mfg. Co., Philadelphia, Pa.	Signal devices
Col. Gal.	Royal Equipment Co., Bridgeport, Conn.	Raybestos linings
Col. Gal.	J. M. Sager Co., Rochester, N. Y.	Shock absorbers and bumpers
Col. Gal.	A. Schraders Sons, Inc., Brooklyn, N. Y.	Tire valves and gauges
Col. Gal.	Schwarz Wheel Co., Philadelphia, Pa.	Wheels
Col. Gal.	C. A. Shaler Co., Waupum, Wis.	Vulcanizers
Basement	Simplex Short Turn Gear Co., Anderson, Ind.	
Col. Gal.	Sparks-Withington Co., Jackson, Mich.	Sparton horns
Col. Gal.	Spicer Mfg. Co., Plainfield, N. J.	Universal joints
Col. Gal.	Splitdorf Electrical Co., Newark, N. J.	Electrical equipment
Col. Gal.	Springfield Metal Body Co., Springfield, Mass.	Convertible bodies
Col. Gal.	Standard Thermometer Co., Boston, Mass.	Standard speedometers
Ann. Gal.	Standard Woven Fabric Co., Farmington, Mass.	Brake linings
Col. Gal.	Sterling Metal Products Co., Lancaster, Pa.	
Ann. Gal.	Stevens & Co., New York	Valve spring removers
Ann. Gal.	Stewart Auto Accessories Co., Chicago	General supplies
Ann. Gal.	Stewart-Warner Speedometer Corp., Chicago	Speedometers, vacuum tanks, clocks
Col. Gal.	Stromberg Motor Devices Co., Chicago	Stromberg carbureters
Col. Gal.	Sulzberger & Sons Co., Chicago	Curled hair for seats
Basement	Sunderman Safety Carbureter Co., Newburg, N. J.	Carbureters
Ann. Gal.	Charles O. Tingley & Co., Rahway, N. J.	Tire specialties
Basement	Toledo Auto Tool Co., Toledo, Ohio	Tools
Ann. Gal.	Triple Action Spring Co., Chicago	Johnson shock absorbers and springs
Ann. Gal.	Tuthill Spring Co., Chicago	Springs
Col. Gal.	United States Lighting and Heating Co., Niagara Falls, N. Y.	Starting and lighting systems
Ann. Gal.	Universal Shock Eliminator Co., New York	Shock absorbers
Col. Gal.	Vacuum Oil Co., New York	Oils and greases
Col. Gal.	Valentine & Co., New York	Varnishes
Col. Gal.	Van Sicklen Co., Aurora, Ill.	Van Sicklen speedometers
Col. Gal.	Veeder Mfg. Co., Hartford, Conn.	Odometers
Col. Gal.	Vesta Accumulator Co., Chicago	Electrical equipment
Ann. Gal.	Voorhees Rubber Mfg. Co., Jersey City, N. J.	Inner sleeves and casings
Col. Gal.	Waltham Watch Co., Waltham, Mass.	Dash clocks, limousine watches
Col. Gal.	Warner Gear Co., Muncie, Ind.	Gears and transmissions
Ann. Gal.	Wayne Oil Tank and Pump Co., Fort Wayne, Ind.	Fuel storage systems
Ann. Gal.	Weaver Mfg. Co., Springfield, Ill.	Jacks
Ann. Gal.	R. C. Wells Mfg. Co., Fond du Lac, Wis.	Batteries
Col. Gal.	Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.	Starting and lighting systems
Col. Gal.	Wheeler and Schebler, Indianapolis, Ind.	Schebler carbureters
Col. Gal.	Willard Storage Battery Co.	Batteries

ARMORY

Gallery	H. T. Adams & Co., Chicago	Vulcanizing outfits
Gallery	Buchanan Electric Wheel Co., Buchanan, Mich.	Wheels
Gallery	Chicago Electric Specialties Co., Chicago	Electric specialties
Gallery	Class Journal Co.	Motor Age, Automobile, Motor World
Gallery	Currier-Koeth Mfg. Co., Coudersport, Pa.	
Gallery	Curtis Pneumatic Machinery Co., St. Louis, Mo.	
Gallery	Cutler-Hammer Mfg. Co., Milwaukee, Wis.	Vulcan electric gearshift
Gallery	Cutting and Smith Sales Co., Detroit, Mich.	
Gallery	D. L. Davis Mfg. Co., Chicago, Inc.	Automatic tire inflators
Gallery	Detroit Steel Products Co., Detroit, Mich.	Springs
Gallery	Electric Products Co., Cleveland, Ohio	Electrical equipment
Gallery	Forest City Electric Co., Cleveland, Ohio	EZ Rider shock absorbers
Gallery	Gray Bros. & Co., Chicago	
Gallery	H. & D. Co., Inc., Goodland, Ind.	
Gallery	Holt-Wells Co., Inc., New York	
Gallery	Massnick-Phipps Mfg. Co., Detroit, Mich.	Headlight deflectors
Gallery	Oakes Co., Indianapolis, Ind.	Fans
Gallery	Peerless Motor Specialty Co., New York	
Gallery	A. J. Picard & Co., New York	General Supplies
Gallery	Positive Supply Co., Davenport, Ia.	
Gallery	Power Gas Products Co., Inc., Minneapolis, Minn.	
Gallery	Right Motor Specialties Co., Chicago	Jacks
Gallery	William Shakespeare, Jr., Co., Kalamazoo, Mich.	
Gallery	So-Sha-Belle Co., Los Angeles, Cal.	Seats
Gallery	Standard Roller Bearing Co., Philadelphia, Pa.	Bearings
Gallery	U. S. Air Compressor Co., Cleveland Ohio.	
Gallery	Vanguard Mfg. Co., Detroit, Mich.	Windshields
Gallery	Victor Lamp Co., Cincinnati, Ohio.	Lamps
Gallery	Western Tire and Rubber Co., Kansas City, Mo.	Tire specialties

SPACE NOT YET ALLOTED

Ahlberg Bearing Co., Chicago	Bearing replacements
Columbus Varnish Co., Columbus Ohio	Varnish and top dressing
Cox Brass Mfg. Co., Albany, N. Y.	Welding outfits
Eco Mfg. Co., Boston, Mass.	Eco piston rings
Harding Distributing Co.	
Heinzlemann Bros. Carriage Co.	
W. H. Howell Co., Geneva, Ill.	Jensen foot pump
Non-Explosive Can Co.	
Turbine Engine Mfg. Co.	
Simms Magneto Co., Bloomfield, N. J.	Magnetos

Cartecar, Case, Chalmers, Chandler, Chevrolet, Cole, Detroit electric, Davis, Dodge, Dort, Enger, Fiat, Franklin, Gadabout, Haynes, Herff-Brooks, Hudson, Hupp, Imperial, Interstate, Jackson, Jeffery, King, Kissel, L. P. C., Lexington-Howard, Locomobile, Lyons-Knight, McFarlan, Maxwell, Mercer, Metz, Mitchell, Moline-Knight, Moon, Pathfinder, National, Marmon, Oakland, Ohio electric, Oldsmobile, Packard, Paige-Detroit, Peerless, Pierce-Arrow, Premier, Rauch-Lang electric, Regal, Remington, Saxon, Scripps-Booth, Stearns-Knight, Studebaker, Stutz, Trumbull, Twombley, Velie, Waverley electric, Westcott, White, Overland and Winton.

In the gasoline vehicle sections, the following cars, not seen at the New York show, will be on display: Abbott, Austin, Bartholomew, Buckeye, Crow, Elkhart, Paterson and Vixen. Chicago also will have an augmented cast of electrics, the American, Milburn and Woods having been added to the six makes exhibited in the east.

Nine makers of gasoline-driven cars, who had space at New York, will not be represented here. Their product bears the following trade names: Crawford, Cunningham, Malcolm, Fischer, Grant, Kline, Owen, Pilot and Reo. This deflection will not spoil the record of the Chicago show which always has had more makes of cars on display than New York could boast of, the absentees numbering nine and the additions totalling eleven. The Cole eight-cylinder also will be displayed.

Manager Miles has ordered a new set of scenery for the Chicago production. The Coliseum will be transformed this week by the decorators into an English garden. The steel girders of the big building will be concealed beneath an expansive blue canopy, representing a clear summer sky, and thousands of square yards of white lattice work will be enployed to conceal the brick walls and to form the sides of the exhibition booths. A line of cream-colored pergolas, with gilded domes, will extend down the center aisle. In addition, posts, of imitation red brick and surmounted by urns filled with flowers, and potted palms will be used to secure the desired garden effect. Vines also will be prominent features of the decorations.

The Chicago show always has been a dealers' show, a big sales impetus, and this year's exhibition will be no exception. More than 18,000 invitations have been mailed to the agents and garage men of the middle west and if the acceptance anywhere near approaches that of previous years, dealers will be prominent in the crowds that will throng the three buildings afternoon and night.

To furnish opposition to the lecturers and to keep the crowds moving, the Ellis Brooks band has been engaged to play the latest fox trots and waltz canters.

Popular This Winter—Making the Eight

MOTOR AGE has made a custom of presenting annually an illustrated review in which representative cars with each of the various body types were grouped. The greater number of closed bodies offered for the 1915 season, as compared with previous seasons, made it necessary that the annual motor car art gallery this year be opened in two sections. Open cars, therefore, were shown in a comprehensive review in the issue of December 31 and the inclosed cars, being supposedly cast in a finer mold, are accorded separate representation in the following pages.

In classifying the body types in these pages, it has been found necessary to adopt certain definitions arbitrarily, which in some cases are not in accordance with the nomenclature employed by certain of the manufacturers. This is because inclosed body names are far from standardized, the same name being applied to several different body types by different designers, and conversely, the same body being designated by different names. Consequently, a nomenclature for this review was adopted which coincided with that used by the greater number of car makers. This will explain, for instance, why one or two bodies which by their makers are called limousines, appear in the group headed Sedans.

Closed Body Styles as Dictated

IN dividing the cars according to body types, Motor Age has classed as limousines those cars having bodies carrying four or more passengers and in which the driver is separated from the passengers by a partition, but the driver's compartment is not completely inclosed by full-length doors.

Berlins are those cars carrying four or more passengers, and in which the driver is separated from the passengers by a partition, but the driver's compartment is completely inclosed by full-length doors.

Landaulets are limousines, the portion of whose top above the rear-seat passengers may be folded back.

Sedans are those cars carrying four or more, all of whom are completely inclosed, but with no partition between front and rear seats.

Coupes are two- or three-passenger completely inclosed cars.

Convertible coupes are two- or three-passenger inclosed cars which may be transformed into open roadsters or runabouts by either folding back the top or removing the upper portion of the body.

Convertible sedans are cars which may be made either open touring cars or sedans by the removal of the upper portion of the sedan body.

Convertible bodies are one of the distinguishing features of the season in body styles. They have come in answer to the demand of the owner-driver for a design which will give him and his family comfort in winter driving combined with the freedom of the open car for summer work without the necessity of maintaining two cars or purchasing two bodies.

About a year ago the convertible roadster-coupes made their appearance. These were an adaptation of the landaulet idea to the two- and three-passenger vehicles. There were nine of them at that time, nearly every different make having a different name, such as landaulet-coupe, cabriolet, convertible, convertible coupe-roadster and landau-roadster.

The number has been increased the present season to sixteen or more but there is nearly as much divergence in names as last year. Cabriolet and coupelet are the most in favor with the manufacturers. In addition to the folding coupe top there is another type, of which the Hupmobile is an example, in which the roadster is converted into a coupe by substituting for the roadster top a wood top of conventional coupe lines.

The most recent addition to this field of convertible bodies is comprised in the convertible sedans or convertible limousines, as they sometimes are called. The term sedan is the more proper one as in no case is the driver separated from the rest of the occupants of the car. The convertible sedan performs the same

Ford, T, Coupelet, Four, 3¾ x 4, two-passenger, $750, 100 W.B., 30 x 3½-inch tires.
Pierce-Arrow, 38-C-3, Coupe-runabout, Six, 4 x 5½, two-passenger, $4,575, 134 W.B., 36 x 4½-inch tires.
Kisselkar, 42-Six, Coupelet, Six, 3⅝ x 5½, two-passenger, $1,950, 126 W.B., 34 x 4-inch tires.
Stearns, Cabriolet, Four, 3¾ x 5⅝, two-passenger, $2,250, 119 W.B., 34 x 4-inch tires.
Velie, model 15, Biltwell coupe, Six, 3½ x 5, three-passenger, $1,850, 124 W.B., 34 x 4-inch tires.
In addition to these, the following cars are made as convertible coupes, but are not illustrated as such: Cadillac, Peerless, Pullman, Scripps-Booth.

by Dame Fashion for this Year

service for the touring car that the convertible coupe does for the roadster.

It makes a completely inclosed car for winter work out of the open touring car. It is distinctly an owner-driver's proposition, and as such has a distinct appeal to the man of family who cannot afford two cars or two bodies, but desires the open car for touring and the closed one for winter city driving. The convertible sedan is simply a touring car provided with two interchangeable tops, one the usual folding top and the other a paneled glass and wood construction. With the latter connections are made with the touring door latches so that the upper halves of the doors in the detachable top unite with the lower portions or touring doors and operate as one solid door.

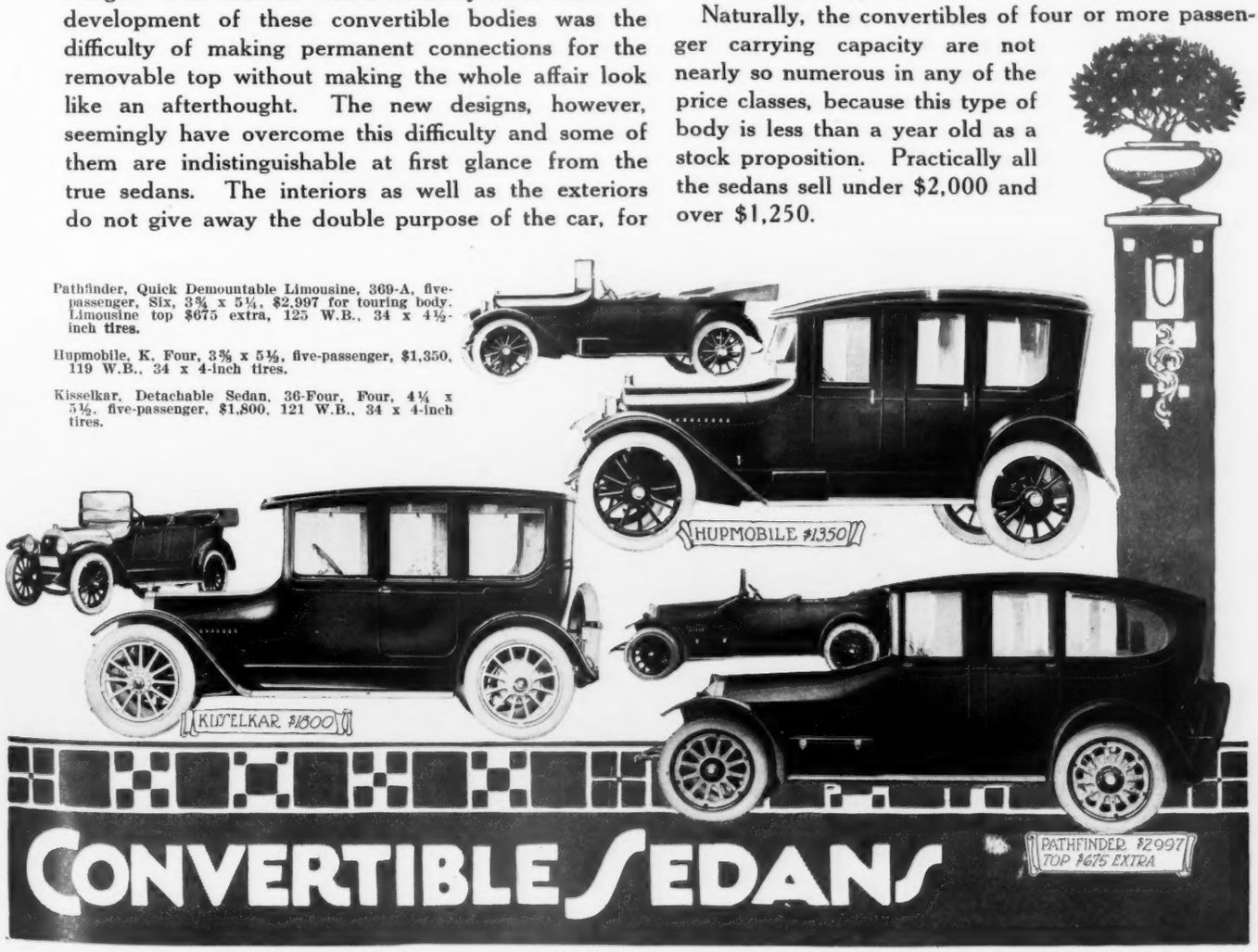
Among the first cars to appear with such bodies as stock bodies were Keeton and Kisselkar. The latter utilizes the two-door design of its touring cars and the bifurcated front seats in producing a convertible sedan having only one door on a side. The same idea recently has been adopted in the latest Pathfinder design. The obstacle which formerly held back the development of these convertible bodies was the difficulty of making permanent connections for the removable top without making the whole affair look like an afterthought. The new designs, however, seemingly have overcome this difficulty and some of them are indistinguishable at first glance from the true sedans. The interiors as well as the exteriors do not give away the double purpose of the car, for in many instances the fittings are as complete as in the conventional inclosed types and even the electric dome and corner lights are not omitted.

It is significant that most of the convertible bodies are in the medium price cars. There are only a few under $1,000 and none over $3,000 in price. The combination coupe-roadsters appear under some one of their various names in all the price classifications.

Among the cars listing at less than $1,250, which we may call the $1,000 class, there are two of the cabriolets. It is in the class of cars selling in the neighborhood of $1,500 that the most of the convertible coupes are found. There are ten or twelve of them which sell at prices between $1,250 and $2,000.

Nearly as many of the two-passenger convertibles are to be found in the class of cars whose price range is between $2,000 and $3,000. There are seven or eight of them in this $2,500 class, as it may be called and more may be expected before the month is out. Altogether, there are no less than twenty different models of this type on the 1915 market.

Naturally, the convertibles of four or more passenger carrying capacity are not nearly so numerous in any of the price classes, because this type of body is less than a year old as a stock proposition. Practically all the sedans sell under $2,000 and over $1,250.

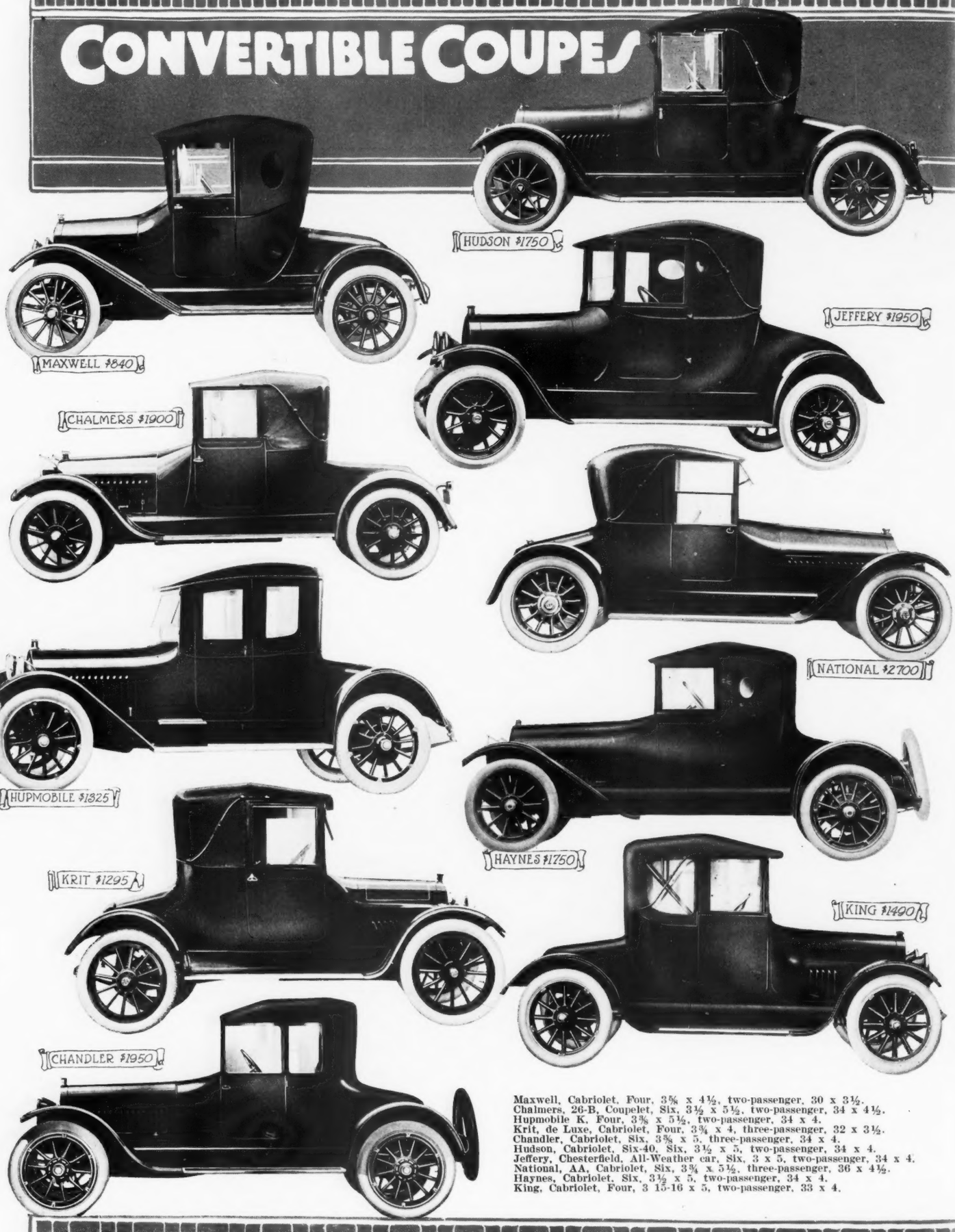


Pathfinder, Quick Demountable Limousine, 369-A, five-passenger, Six, 3¾ x 5¼, $2,997 for touring body. Limousine top $675 extra, 125 W.B., 34 x 4½-inch tires.

Hupmobile, K, Four, 3⅜ x 5½, five-passenger, $1,350, 119 W.B., 34 x 4-inch tires.

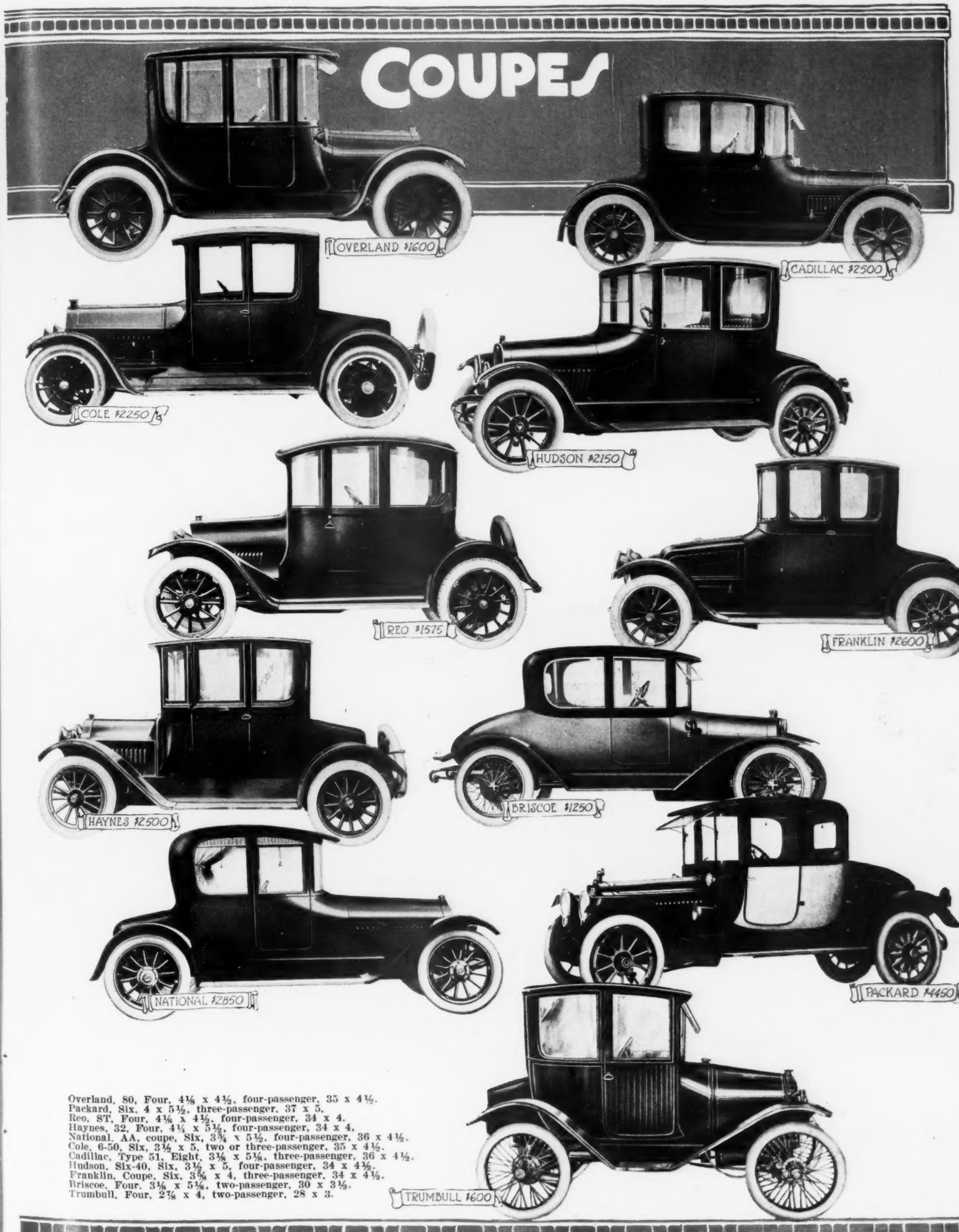
Kisselkar, Detachable Sedan, 36-Four, Four, 4¼ x 5½, five-passenger, $1,800, 121 W.B., 34 x 4-inch tires.

CONVERTIBLE COUPES



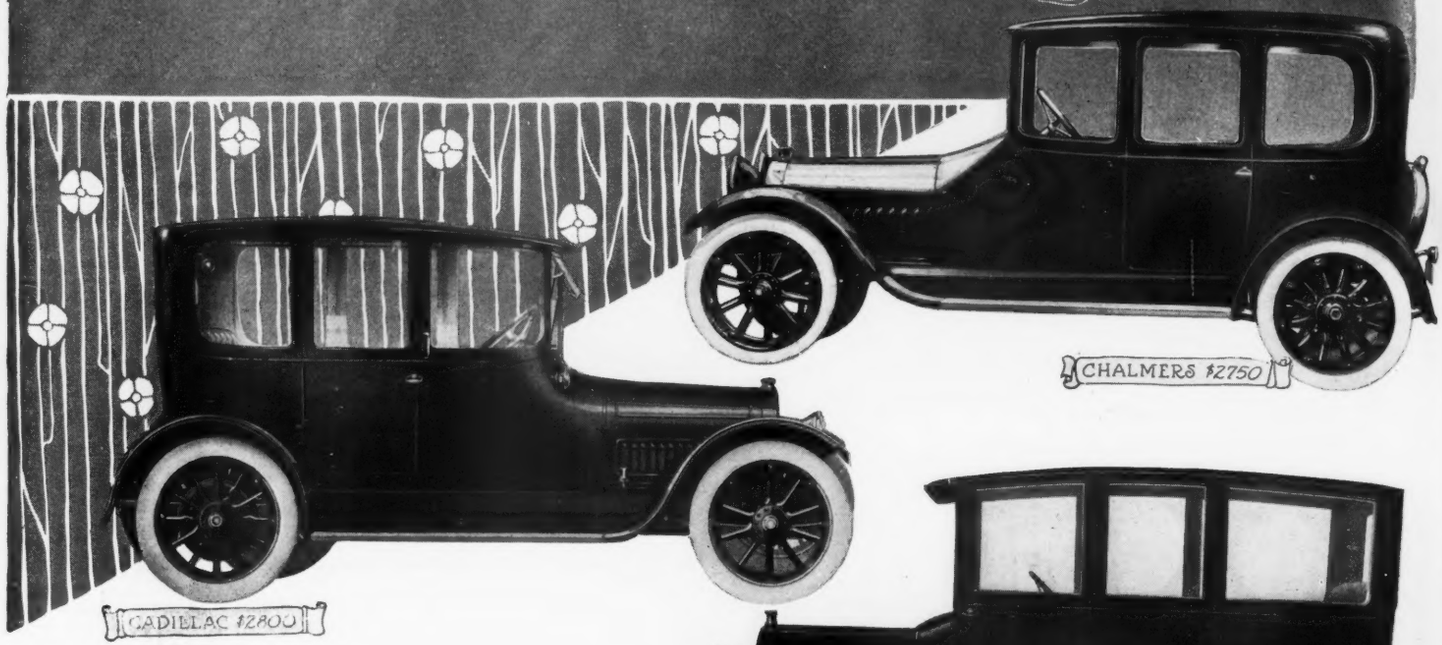
Maxwell, Cabriolet, Four, 3⅝ x 4½, two-passenger, 30 x 3½.
Chalmers, 26-B, Coupelet, Six, 3½ x 5½, two-passenger, 34 x 4½.
Hupmobile K, Four, 3⅜ x 5½, two-passenger, 34 x 4.
Krit, de Luxe, Cabriolet, Four, 3¾ x 4, three-passenger, 32 x 3½.
Chandler, Cabriolet, Six, 3⅝ x 5, three-passenger, 34 x 4.
Hudson, Cabriolet, Six-40, Six, 3½ x 5, two-passenger, 34 x 4.
Jeffery, Chesterfield, All-Weather car, Six, 3 x 5, two-passenger, 34 x 4.
National, AA, Cabriolet, Six, 3¾ x 5½, three-passenger, 36 x 4½.
Haynes, Cabriolet, Six, 3½ x 5, two-passenger, 34 x 4.
King, Cabriolet, Four, 3 15-16 x 5, two-passenger, 33 x 4.

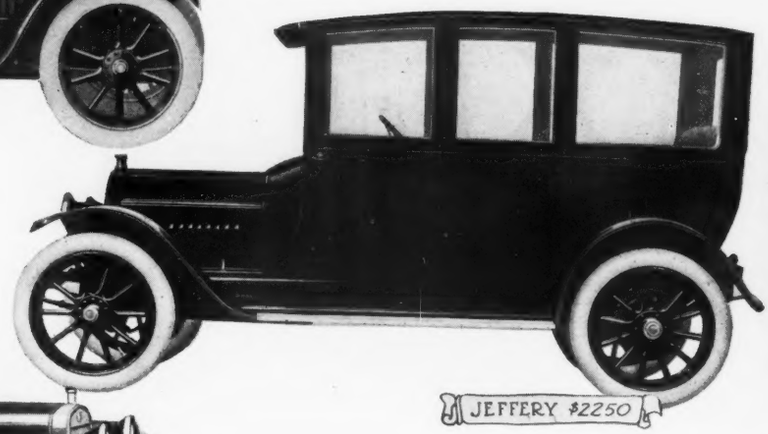
COUPES

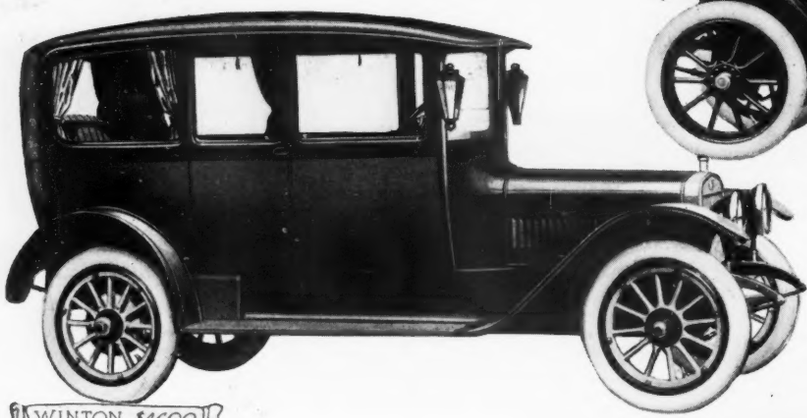


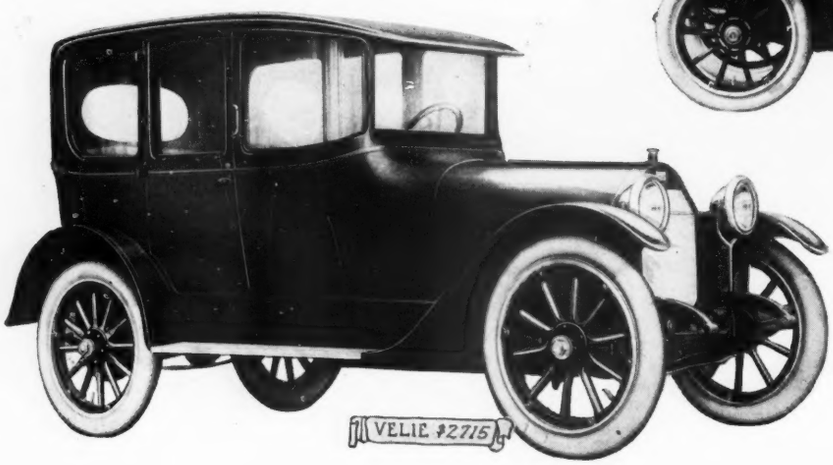
Overland, 80, Four, 4⅛ x 4½, four-passenger, 35 x 4½.
Packard, Six, 4 x 5½, three-passenger, 37 x 5.
Reo, ST, Four, 4⅛ x 4½, four-passenger, 34 x 4.
Haynes, 32, Four, 4¼ x 5½, four-passenger, 34 x 4.
National, AA, coupe, Six, 3¾ x 5½, four-passenger, 36 x 4½.
Cole, 6-50, Six, 3⅛ x 5, two or three-passenger, 35 x 4½.
Cadillac, Type 51, Eight, 3⅛ x 5⅛, three-passenger, 36 x 4½.
Hudson, Six-40, Six, 3½ x 5, four-passenger, 34 x 4½.
Franklin, Coupe, Six, 3⅝ x 4, three-passenger, 34 x 4½.
Briscoe, Four, 3⅛ x 5½, two-passenger, 30 x 3½.
Trumbull, Four, 2⅞ x 4, two-passenger, 28 x 3.

SEDANS



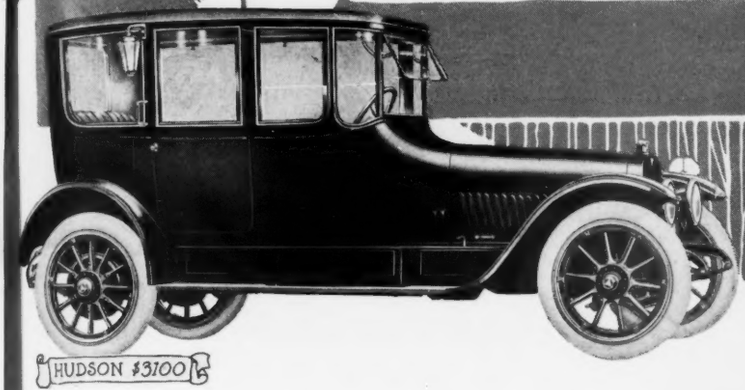




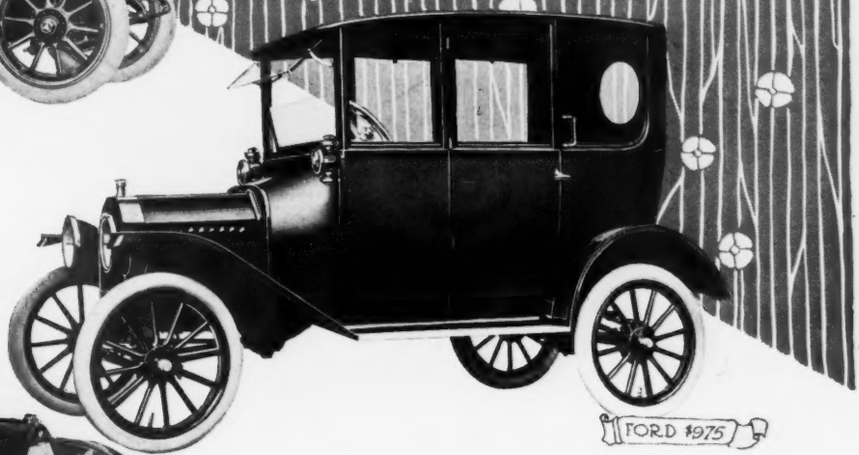


Cadillac, 51, Eight, 3⅛ x 5⅛, five-passenger, 36 x 4½ tires.
Winton, 21, Six, 4½ x 5½, six-passenger, 37 x 5 tires.
Chandler, Six, 3⅜ x 5, five-passenger, 34 x 4 tires.
Chalmers, 26B, Six, 3½ x 5½, five-passenger, 34 x 4½ tires.
Jeffery, Four, 3¾ x 5¼, four-passenger, 34 x 4 tires.
Velie, model 10, Six, 3¾ x 5¼, five-passenger, 37 x 4½ tires; model 9, Four, 4⅝ x 5¼, five-passenger, 37 x 4½ tires.

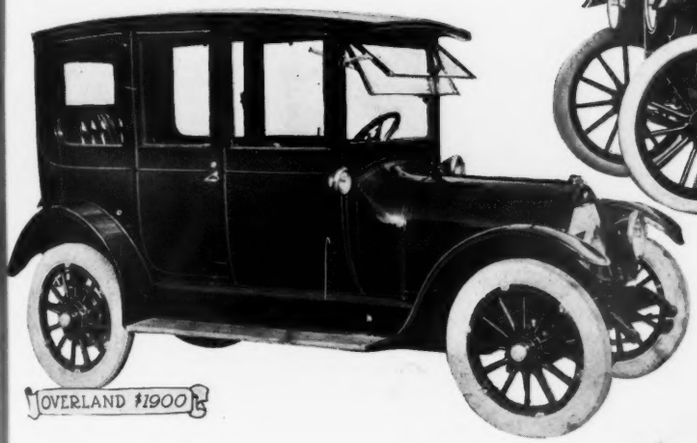
SEDANS



HUDSON $3100

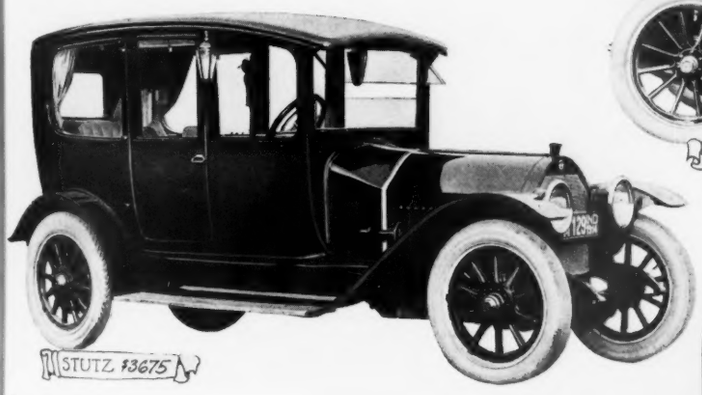


FORD $975



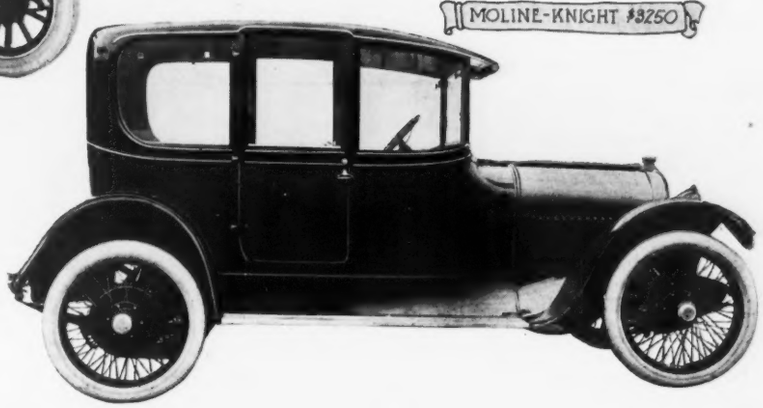
OVERLAND $1900

FRANKLIN $3000



STUTZ $3675

MOLINE-KNIGHT $3250



Hudson, 6-54, Six, 4⅛ x 5¼, five-passenger, 36 x 4½ tires.

Overland, 80, Four, 4⅛ x 4½, five-passenger, $1,900 with extra touring body, 35 x 4½ tires.

Stutz, Four, 4¾ x 5½, six-passenger, $3,675, 34 x 4½ tires; Six, 4 x 5, six-passenger, $3,800.

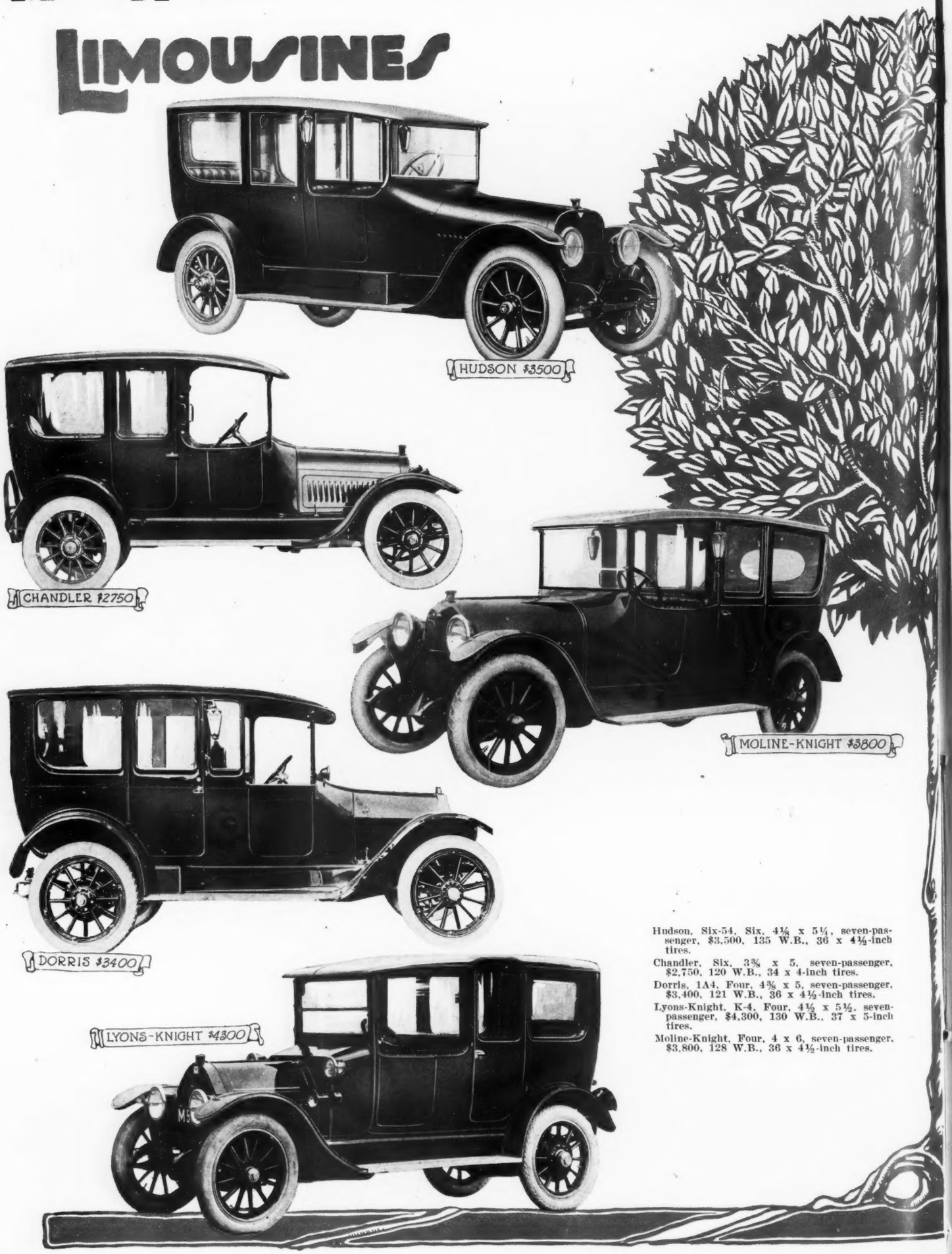
Ford, Four, 3¾ x 4, five-passenger, 30 x 3½ tires.

Franklin, Six, 3⅜ x 4, five-passenger, 34 x 4½ tires.

Moline-Knight, Four, 4 x 6, five-passenger, 36 x 4½ tires.

In addition to these, the following cars are made as sedans, but are not illustrated as such: Kisselkar, Dorris, Lexington, Great Western, Lyons-Knight, Peerless, Pullman, S.G.V., White.

LIMOUSINES



Hudson, Six-54, Six, 4⅛ x 5¼, seven-passenger, $3,500, 135 W.B., 36 x 4½-inch tires.

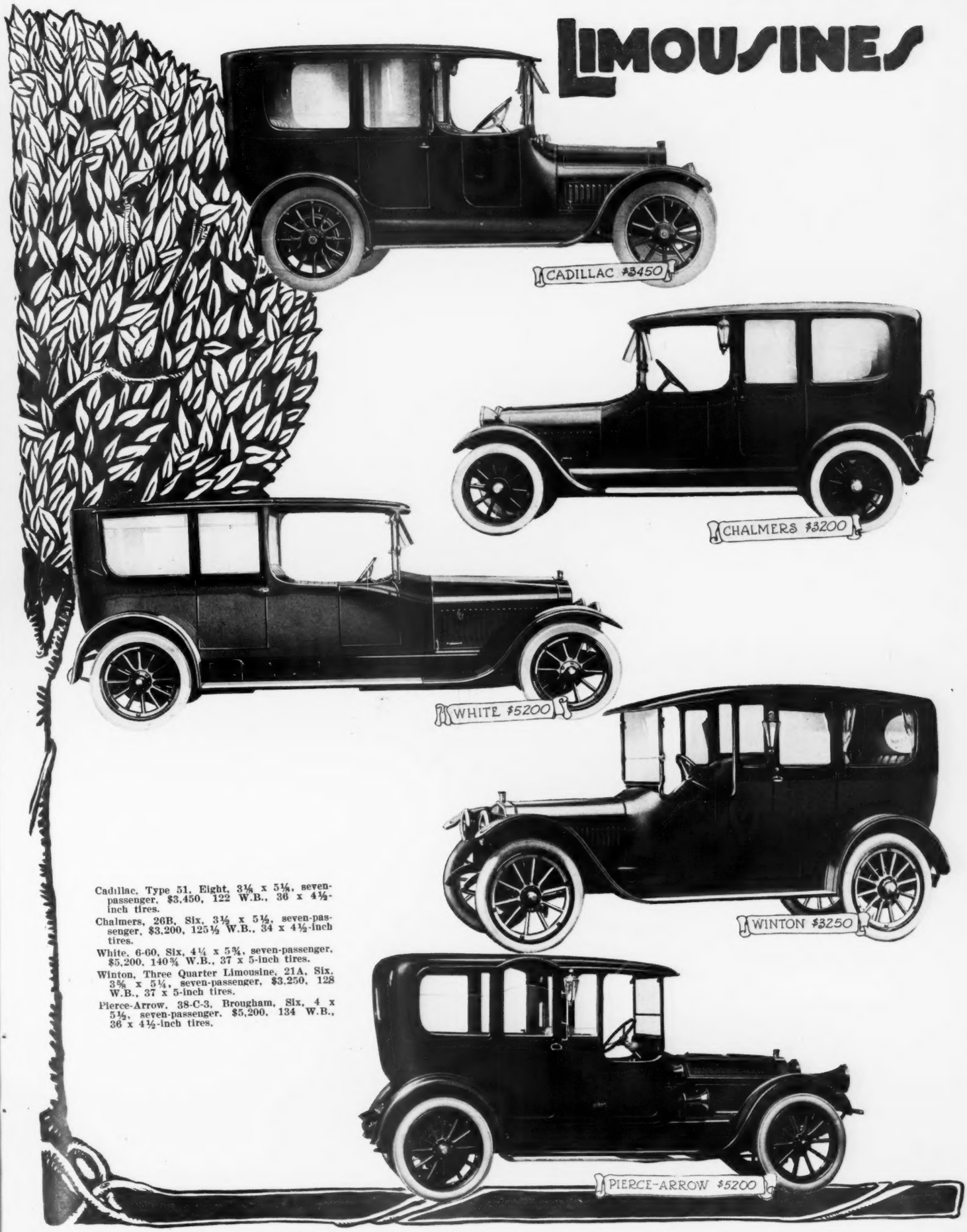
Chandler, Six, 3⅝ x 5, seven-passenger, $2,750, 120 W.B., 34 x 4-inch tires.

Dorris, 1A4, Four, 4⅜ x 5, seven-passenger, $3,400, 121 W.B., 36 x 4½-inch tires.

Lyons-Knight, K-4, Four, 4½ x 5½, seven-passenger, $4,300, 130 W.B., 37 x 5-inch tires.

Moline-Knight, Four, 4 x 6, seven-passenger, $3,800, 128 W.B., 36 x 4½-inch tires.

LIMOUSINES



Cadillac, Type 51, Eight, 3⅛ x 5⅛, seven-passenger, $3,450, 122 W.B., 36 x 4½-inch tires.

Chalmers, 26B, Six, 3½ x 5½, seven-passenger, $3,200, 125½ W.B., 34 x 4½-inch tires.

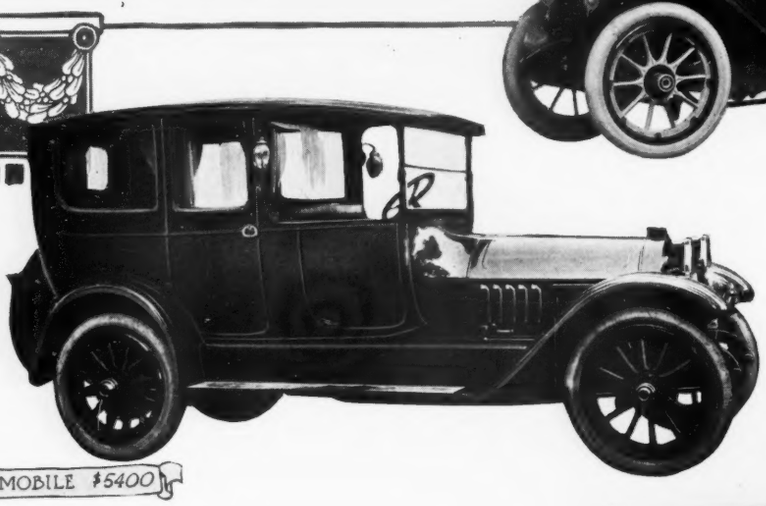
White, 6-60, Six, 4¼ x 5¾, seven-passenger, $5,200, 140¾ W.B., 37 x 5-inch tires.

Winton, Three Quarter Limousine, 21A, Six, 3⅝ x 5¼, seven-passenger, $3,250, 128 W.B., 37 x 5-inch tires.

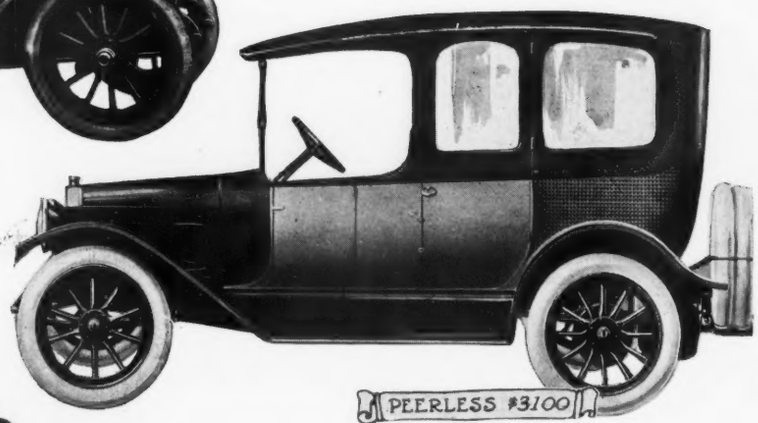
Pierce-Arrow, 38-C-3, Brougham, Six, 4 x 5½, seven-passenger, $5,200, 134 W.B., 36 x 4½-inch tires.

LIMOUSINES

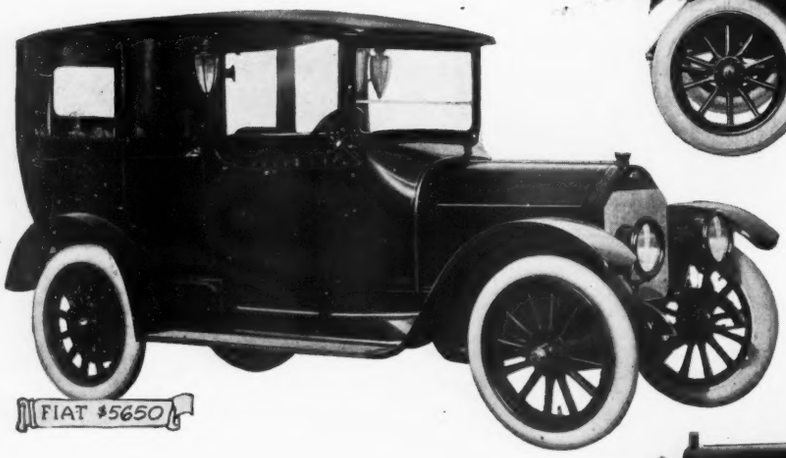
PACKARD $4900



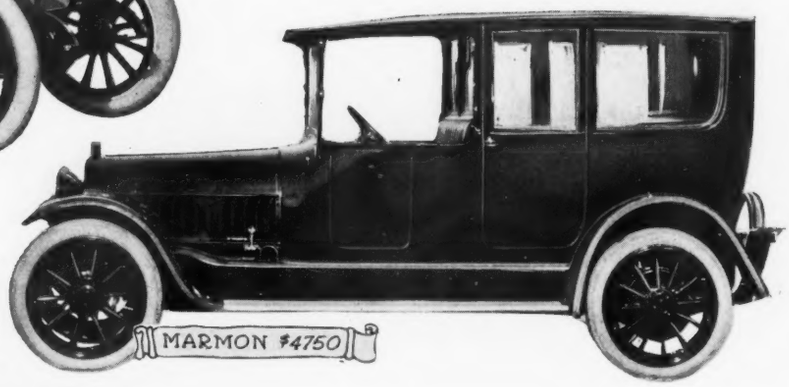
LOCOMOBILE $5400



PEERLESS $3100



FIAT $5650



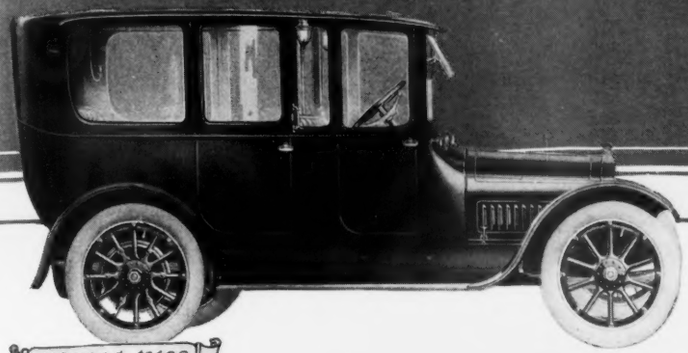
MARMON $4750

SIMPLEX $6500

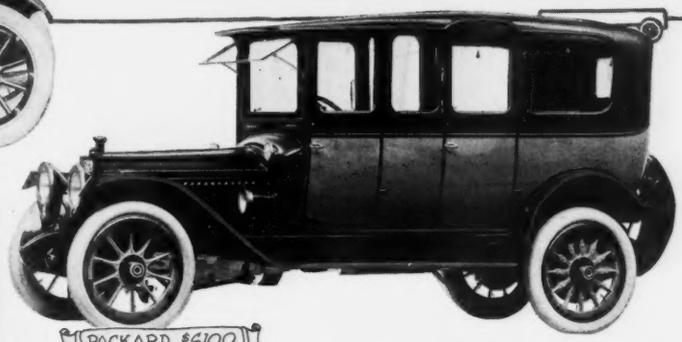
Locomobile, 38, Six, 4¼ x 5, seven-passenger, 37 x 5 tires.
Fiat, Limousine 55, Four, 5⅛ x 6⅛, seven-passenger.
Simplex, Four, 5⅝ x 6½, seven-passenger, 37 x 5 tires.
Packard, 3-38, Six, 4 x 5½, six-passenger, 37 x 5 tires.
Peerless, All Purpose Four, Four, 3¾ x 5, seven-passenger.
Marmon, 41, Six, 4¼ x 5½, seven-passenger, 36 x 4½ tires.

In addition to these, the following cars are made as limousines, but are not illustrated as such: Jeffery, Kline, Stearns, Austin, Chadwick, Cunningham, Great Western, Kisselkar, Lexington, Pullman, S. G. V., Stevens-Duryea, Touraine.

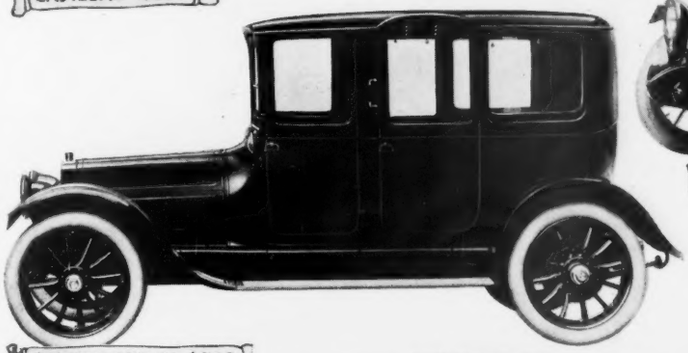
BERLINES



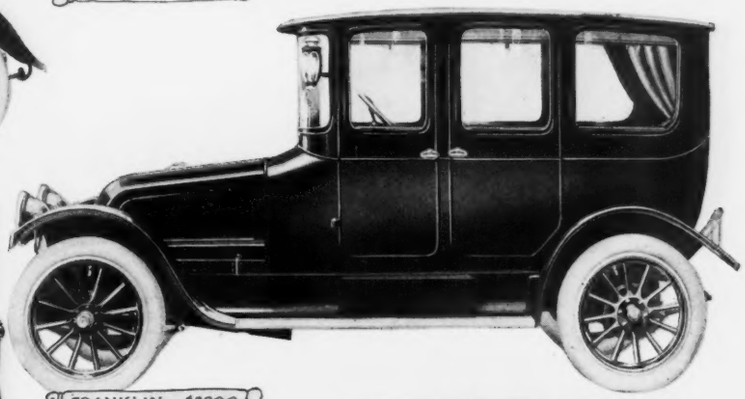
CADILLAC $3600



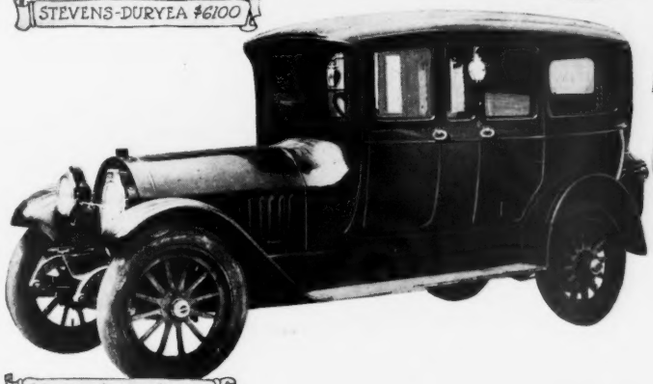
PACKARD $6100



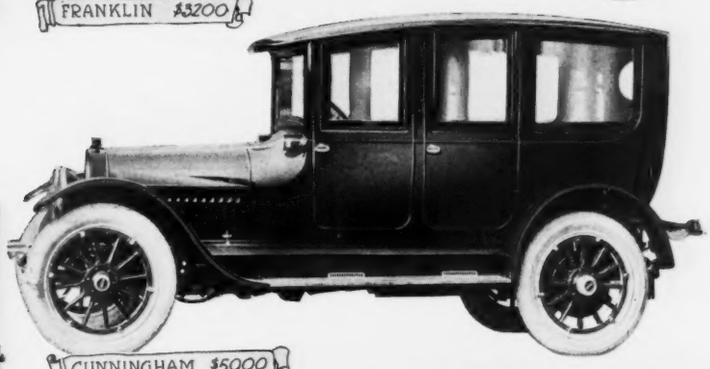
STEVENS-DURYEA $6100



FRANKLIN $3200

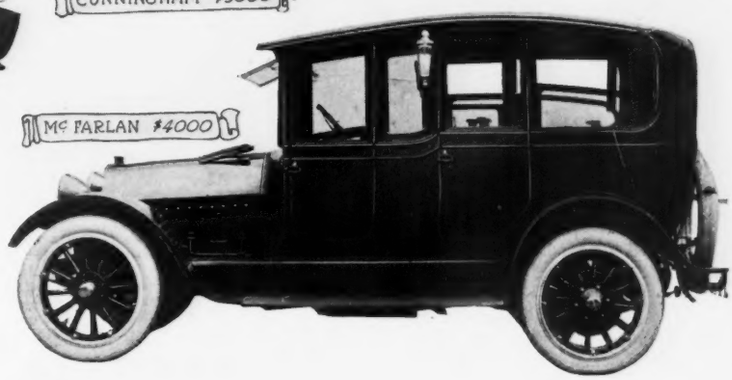


LOCOMOBILE $5700



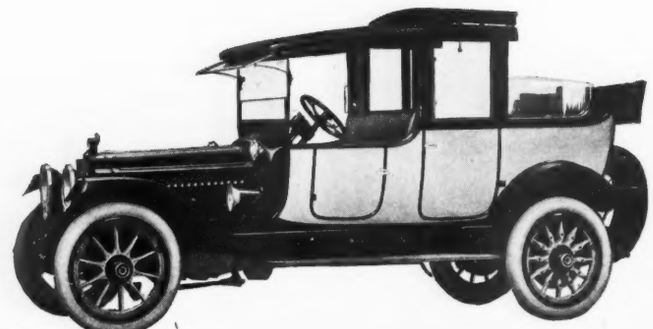
CUNNINGHAM $5000

GREAT EAGLE $5000

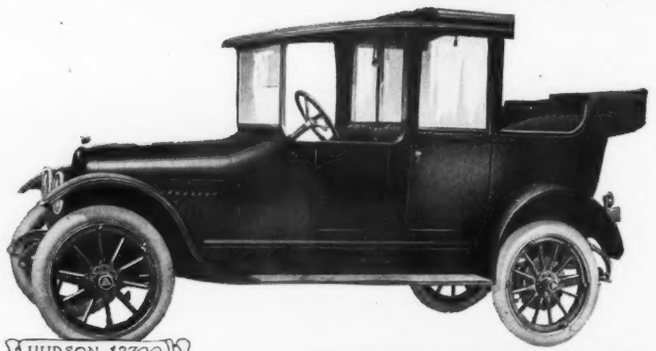


McFARLAN $4000

Cadillac, type 51, Berlin Limousine, Eight, 3⅛ x 5⅛, seven-passenger.
Stevens-Duryea, Limousine, Six, 4 7/16 x 5½, seven-passenger.
Locomobile, 38 Berline, Six, 4¼ x 5, seven-passenger.
Great Eagle, 1272 Limousine, Four, $5,000; Six, $5,500.
Packard, Limousine, 5-48, Six, 4½ x 5½, seven-passenger.
Franklin, Berlin, Six, 3⅝ x 4, six-passenger.
Cunningham, Limousine, Four, 4¾ x 5¾, seven-passenger.
McFarlan, Model 79-T, Six, 4 x 6, seven-passenger.
In addition to these, the following cars are made as berlines, but are not illustrated as such: Fiat, Peerless.

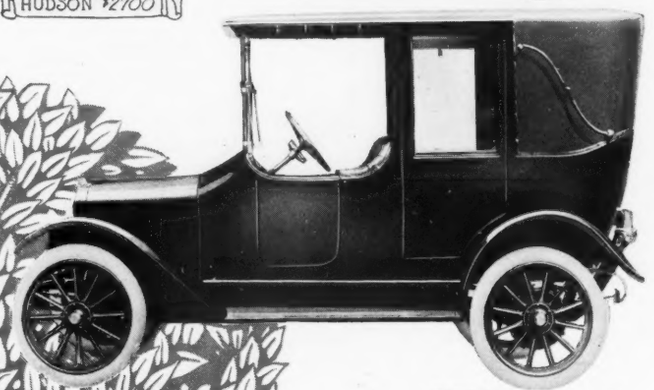


PACKARD $4900



HUDSON $2700

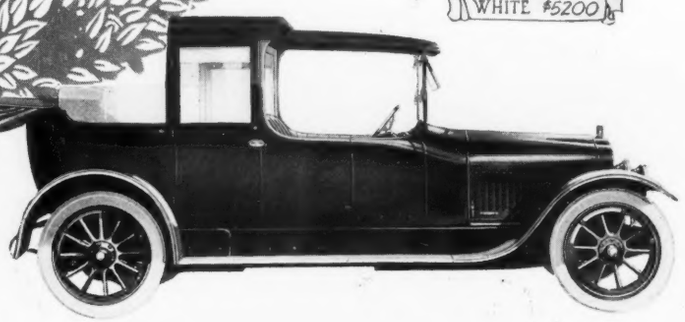
PIERCE-ARROW $5200



MAXWELL $920

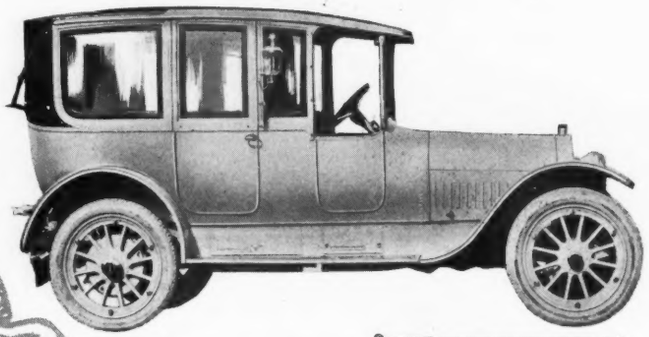
LANDAULETS

WINTON $4600



WHITE $5200

SIMPLEX $6500



CUNNINGHAM $5000

Packard, Six, 4 x 5½, six-passenger.
Pierce-Arrow, 38-C-3, Six, 4 x 5½, seven-passenger.
Winton 21, Six, 4½ x 5½, seven-passenger.
Simplex, Four, 4⅞ x 6½, seven-passenger.
Hudson, 6-40. Six, 3½ x 5, six-passenger.
Maxwell, Town car, Four, 3¾ x 4½, six-passenger.
White, 45 Landaulet-Limousine, Four, 4¼ x 6⅜.
Cunningham, Model R, Four, 4¾ x 5¾, seven or eight-passenger.

Development in Art of Body Design for Inclosed Cars

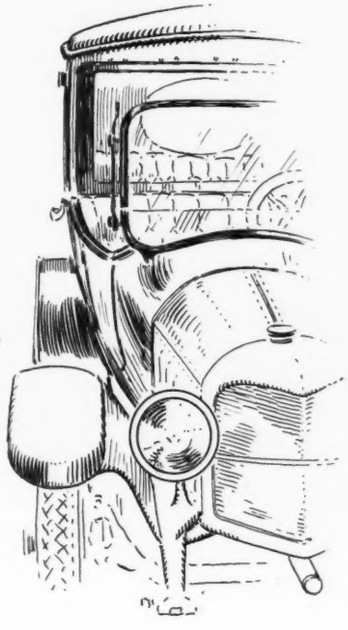
Improvements Evidenced in Both Esthetic and Practical Sides

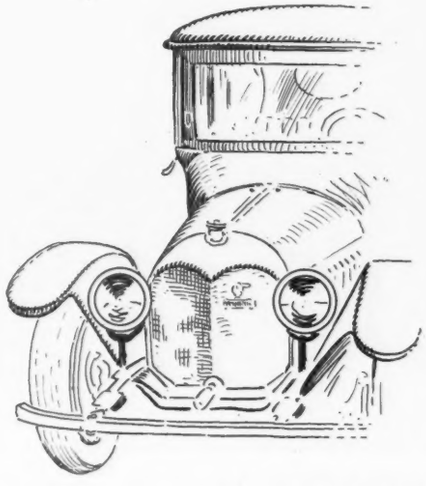
INCLOSED cars for 1915 provide a most interesting study of the body designer's art, and there is perhaps more advance to be seen from both the esthetic side and that of utility during the past 12 months than has been evident at the end of any previous similar period. In general, the two seemingly opposed ideas of greatest comfort and greatest beauty of line have been approached simultaneously. Just how this has been accomplished requires a special study of each of the different body designs as each artist-engineer has had his own ideal in mind and has approached it in his own individual way justifying it by results.

However, on the whole, it may be stated that as comfort cars the new models are very much ahead of their predecessors of previous seasons. The majority of them are larger throughout. There is more seating room without lessened upholstery. There is more leg room. A three-passenger coupe, for instance, can carry its full quota without uncomfortable crowding. The same thing is true of the larger inclosed cars such as the sedans, limousines, etc. To gain this very desirable effect, it has been necessary only to shorten somewhat the deck at the rear in the case of the coupes, so that an increase in wheelbase has not been found necessary.

The somewhat lessened overall length of the motors this year has made possible a shorter hood and consequently has given more room within the interior of the closed cars and permitted the wheelbase to remain the same. There has not been a great deal of change in upholstery methods, although some of the extravagantly deep cushions which appeared last year have been reduced to a somewhat saner depth. The conservative maker has held his cushions to something very close to 10 inches as giving the greatest comfort combined with good wearing qualities. Improvement in spring suspension and other things which make for easier riding in the cars, a tendency which has been growing for many years, has rendered it a waste of luxury to provide a cushion depth much greater than that.

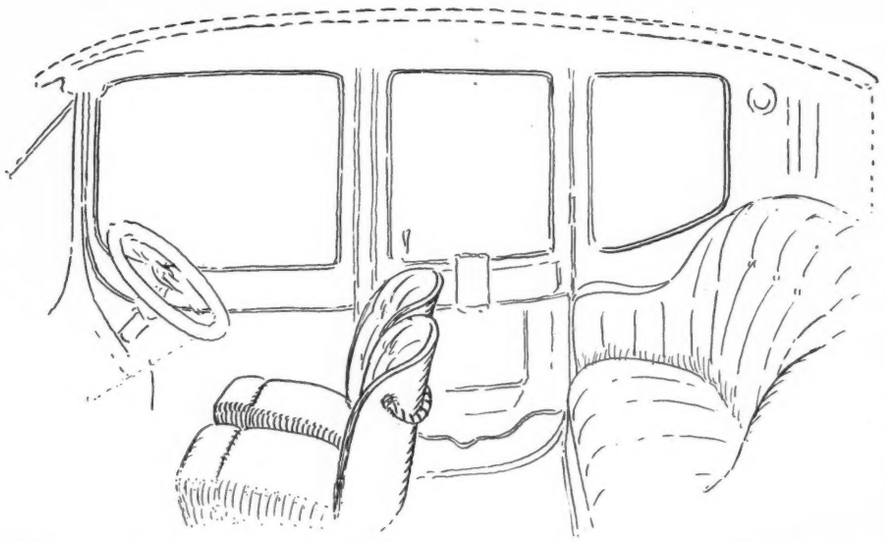
The divided front seat, the chair-type of seat, either independently movable or capable of revolving on the pedestal, have become even more





A Study in Body Lines as Evidenced in New Inclosed Cars

The sketch at the left illustrates an Oakland limousine and shows how the boat effect is obtained. The upper of the two at the center is a Velie sedan and the lower one a Pathfinder. At the right is a Locomobile limousine



Interior of a New Cadillac Sedan Showing the Chair Front Seats and the Lounge-Type Rear Seat

popular in the inclosed car field than they are in the touring cars. This is only logical inasmuch as the introduction of this seating arrangement came originally through the inclosed car, being developed first in the electric. It was with the advent of seating arrangements which provided a passage way between the two front seats that made the sedan body possible, for the value of the compartment type of body is lessened if free intercommunication between front and rear-seat passengers is in any wise restricted by a partition, such as that formed by the back of the complete transverse front seat.

Likewise it was the extension of the vestibule seating arrangement into the touring car class that made the convertible body applicable to cars of more than two or three-passenger capacity—that is, applicable as a manufacturers' equipment. It is true that one or two of the detachable sedans marketed as stock equipment by the lower-priced car makers do not have the bifurcated front seats, but the advantage of the convertible feature makes it more than worth while.

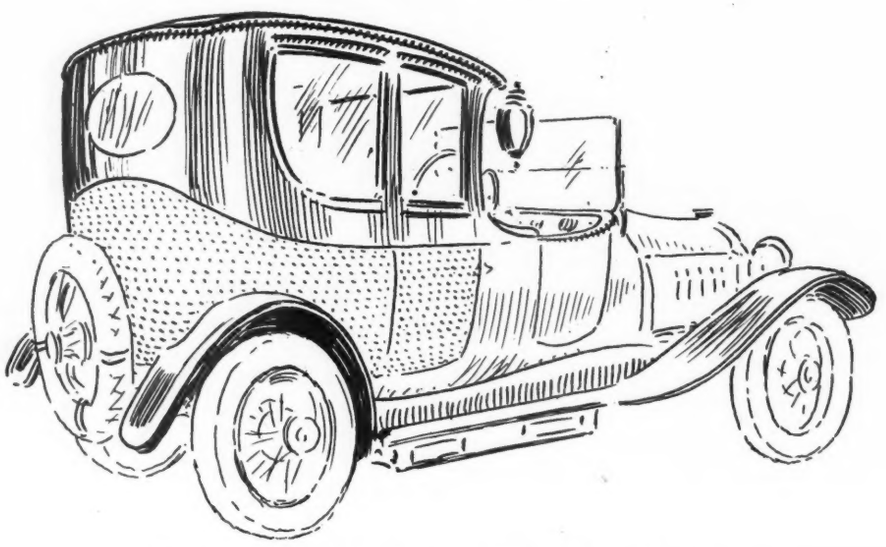
The two-door idea has been extended to the inclosed cars and has found particular favor in this field. This type of entrance arrangements is one in which there is but a single door on either side of the car and permits entrance and egress from either front or rear seats. Of course, with types on the vestibule idea, the divided front seats are an absolute necessity.

To the observer of the 1915 inclosed cars, if he were to see them grouped together, would come a rather distinct impression of long flowing lines, smooth curves and an unusual amount of glass. It is quite possible that the first impression will be that the new cars are trimmer than their predecessors. There are several reasons why this should be so.

In a great many instances, frames are considerably lower. This is a tendency that probably will be found a permanent one if the action of makers of such cars as White, Pierce-Arrow and others is any criterion. Most of the concerns have succeeded in one way or another in getting their chassis nearer the ground without materially lessening the road clearance. In the inclosed-car field this feature is particularly worthy of approval for one of the body designer's chief difficulties is to produce a superstructure for inclosed bodies that will give ample headroom without giving the appearance of being top-heavy.

There is another feature in which this lowering of the car will be appreciated, by the car's passengers—if not by the man on the street. This is the fact that a lower step is permitted and thus it is possible for a feminine passenger to enter the vehicle without the display of hosiery that often is unavoidable where the step is too far from the ground.

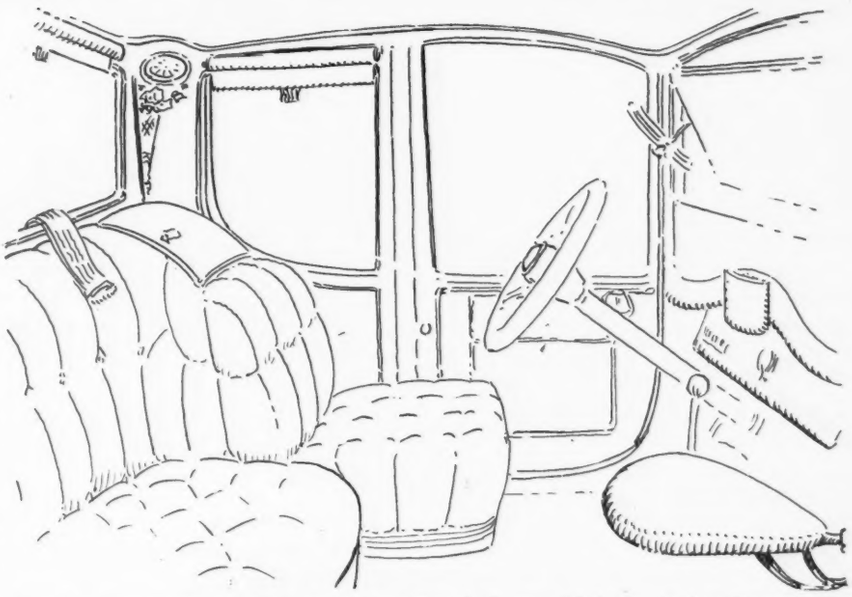
Trimness in appearance also comes from the general attempt of manufacturers to develop further the streamline principle in their vehicles as a whole. This is not limited to the closed cars but it is in these bodies that the idea can be carried out most fully and with best results. The ostensible object of streamlining, that of reducing wind resistance, may not be the moving one with the makers of the luxurious closed cars, but the fact that the large wind resisting area of closed



Basket Body Limousine on Willys-Knight Chassis

cars does effect speed and economy gives an engineering basis for that artistic instinct to which the smooth flowing lines appeal. At the same time it presents a pretty problem to the body designer to combine the trinity of good engineering, artistic excellence and a comfortable, roomy interior.

Application of the cleverly curved cowls between the engine hood and what formerly was the dashboard has had a distinct effect in altering the appearance and at the same time of increasing efficiency, for it undeniably is easier to drive a pointed body through the air than it is a flat one. At the rear of the car the proper design for streamlining is as important as it is at the front, as witness marine practice. Most of the body builders have given thought to the rear lines with a consequent improvement in efficiency and looks.



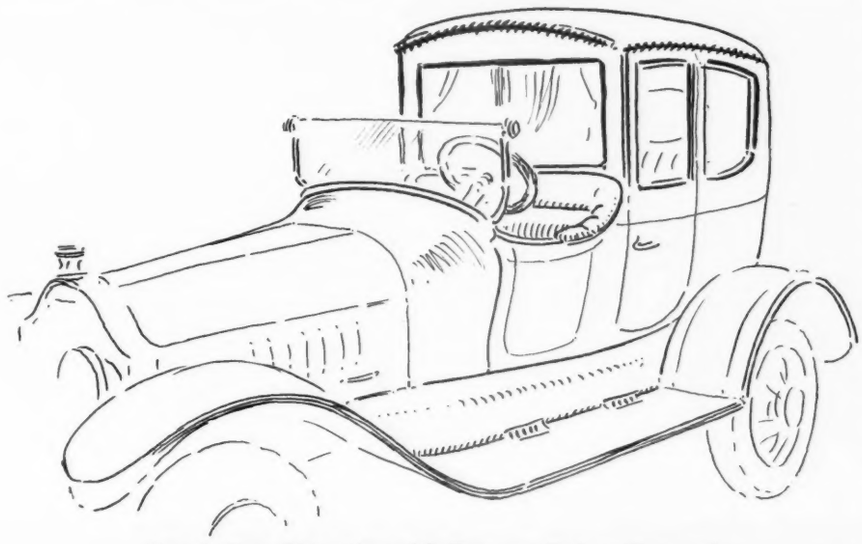
Seating Arrangement of New Scripps-Booth Coupe. Main Seats Are Stepped and Extra Seat Swings Back Under Cowl

Toward the rear, the bodies are rounded or tapered slightly, both by making them slightly narrower at the rear than they are at the middle and by curving the roof downward at the rear. This year's chief improvement in this regard is in providing softer corners and edges by smooth curves instead of sharp angles.

In rounding off the vertical edges both at front and rear, the designer has faced the problem of giving smooth curves and at the same time meeting the popular demand for maximum window space. Consequently, the use of curved glass for the corners has increased materially.

Likewise, designers have endeavored to provide arrangements for opening up the inclosed cars to the greatest possible extent, particularly for warm-weather driving. Not only are the windows in the doors capable of being opened but also it is possible in most instances now to drop the window in the back and sometimes those in the side panels. The use of sashless windows, which came into practice to a slight extent last year, is almost the rule throughout the inclosed cars this season.

To get down to the body types themselves, we find that the limousines are by far more popular than any other body type, if we are to judge by the number of different models offered. There are thirty-seven different models of limousines on the 1915 market and this is more than twice as many models as are offered in any other one type of body. Next to the limousine the sedan shows the greatest popularity. There are twenty-three of these and their number is growing more rapidly than that of any of the others. It is to be expected that before many years the sedans will outnumber the limousine. The landaulets come next. being found on eighteen different cars, and the coupes and the combination coupe-roadster also are found on an equal number of models. Berline bodies, which are closely related to the sedans, being the same except for the partition between the front and rear seat passengers in the berline body, have a following of eight models and the brougham is found on two; a town car which is usually a small limousine is on three different chassis.

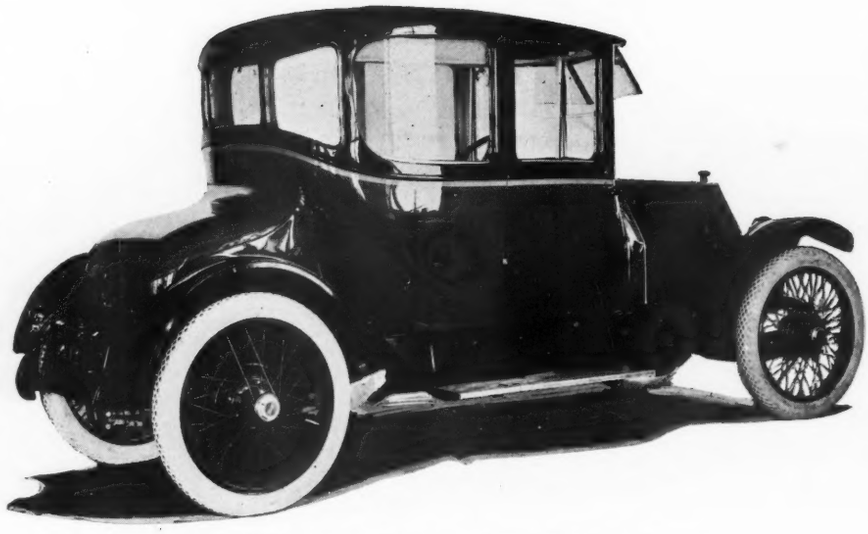


Cunningham Limousine with Top over Driver Removed

The class of buyer to which the different sorts of inclosed cars appeal can best be illustrated by a consideration of the numbers of different models offered by the manufacturers as divided on a price basis. Of the cars which list with complete equipment at less than $1,250, there are only five

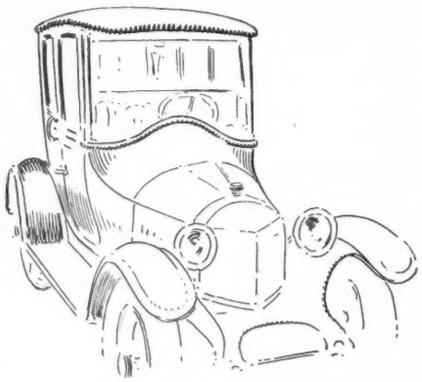
inclosed cars. There is one coupe, a coupelet, two town cars and one sedan.

Among the cars selling between $1,250 and $2,000 we find the convertible coupe-roadster, variously known as coupelet, cabriolet, landau-roadster, etc., to be very much in the lead. There are ten of these offered in this $1,500 class, as it may be called. There are three coupes, a convertible sedan and one conventional sedan.



Lewis VI Coupe with Exceptional Window Space

In the $2,500 class, that is, those cars whose list price runs from $2,000 to $3,000, we find that the sedan has the call, with the coupelet a close second; the former appears in nine different models and the coupelet in seven. The coupe proper appears in five styles, the limousine in three and the laudaulet in one.



Scripps-Booth Coupe

Among the cars of higher price, that is, those which sell at over $3,000, the limousines are by far the most popular. There are thirty-four limousine models in this price classification and only three in all of the other classes together, and these three are confined to the $2,500 class of cars. The landaulet comes next in popularity among the makers of cars which list in this highest-price class. There are seventeen of these as against twelve sedans, nine coupes, eight berline bodies, two broughams and a town car.

If we consider some of the individual cars which show some of the present tendencies in closed-car body design we are confronted with a wealth of examples of up-to-the-minute practice. An evidence of one of the forcible trends at the moment is the new Lewis VI sedan. This body was designed with the idea of providing all the openness of the touring car combined with the elegance and protection of a completely inclosed vehicle and one which can be made as exclusive as desired.

This is accomplished by providing an unusually great amount of window space, the greater portion of which can be lowered in the body panel for opening up the rear and side, but, in addition, there is a skylight in the roof which makes about a third of the roof transparent, but which can be closed by a silken curtain.

Another feature which has received considerable attention from designers is the difficulty in seeing through a windshield which is coated with snow or rain. This has been overcome in many instances by using an additional upper half of the windshield. In some cases this is a fixed glass shelf inclined at an angle which catches the rain or snow and prevents it from sticking on the windshield glass proper. In other instances, the second or outer glass is permanently attached to the upper half of the windshield and turns with it. This method is used in a Franklin and the stationary glass arrangement is employed on the Overland coupe, the Lewis VI sedan; the Scripps-Booth coupe and a number of others.

One of the Cunningham inclosed models is an open-front limousine or a brougham which is provided with a detachable roof over the driver's compartment, thus converting the car into a true limousine.

In the matter of body refinement, in fact, the past year has marked the greatest degree of progress since the inception of the industry. Increased attention to the beauties of European designs, more advanced conceptions of engineering in respect to wind resistance and economy, etc., and a more critical demand on the part of the motor-buying public have directed the attention of the makers to the need for the minor refinements usually referred to as luxuries. Dome lights, step lights, baggage compartments and general comfort were given but slight consideration a few years ago though they are now accepted as a matter of course and the people are requiring more and more complete equipment every year. The body designs of today may not be taken as the ultimate in coach work but they indicate that designers and builders are giving every thought to the perfection of detail required to render their work at the same time beautiful, comfortable and durable. Particularly are the closed cars replete with thoughtful little touches calculated to catch the eye of the prospective owner; luxurious upholstery harmoniously blending with the color scheme, side pockets with toilet articles, dome and side lights, in fact, everything to assure the comfort of the passenger, such is the closed car of today.

Tells of Pioneer Days in the Electric Vehicle Industry

Veteran Traces Progress of the Business in America

Editor's Note—The following paper on the "Influence of the Pioneer Spirit on Electric Vehicle Progress" was read at a recent meeting of the New York section of the Electric Vehicle Association of America by R. McAllister Lloyd, consulting engineer of the city of New York.

* *

THE first impulse to bring into existence the electric vehicle came from a desire on the part of storage battery manufacturers to find a market for batteries. The battery business began in 1886 and for 5 or 6 years all efforts were spent in developing street railway traction. The manufacturers seemed to feel at that time that the great field for storage batteries was for use in connection with street cars, but as storage battery traffic of that day was not very successful, the manufacturers endeavored to find a new outlet for their product.

The early history of storage battery development concerns two big companies—the Consolidated Storage Battery Co., which brought the Julius battery from Europe and purchased the Brush patents in this country, and the Accumulator Storage Battery Co., which brought the Faure batteries to this country in 1886. These two companies soon were involved in long and costly patent litigation. Each sued the other and each had its patents sustained. The factories of both therefore were shut up by 1891. The little storage battery factory which I started also was shut up by the same litigation.

The Accumulator company then retained me as engineer with a view to avoiding the infringement of other patents and to study and investigate possible applications of the storage battery. We did not know at that time what good they were, if they were not used in street cars. About the first application that suggested itself was electric vehicles. A great French engineer, Hospitalier, published a paper in 1891 conclusively proving it impossible to run a vehicle with batteries that would go up a 7 per cent grade in a road. This could not be refuted for the reason that nobody had tried it and the first electric vehicle that I saw was in 1891.

Building in 1898

In the winter of 1898, the Accumulator company began to build twelve electric omnibuses for service in Washington, the people there being unable to obtain a franchise for laying tracks in the city streets. The first one of these put into service was so bad that the other eleven never were built. But we got a little experience.

About that time the Electric Storage Battery Co. of Philadelphia came into existence, bringing from Europe the chloride battery which was not supposed to infringe the patents in this country. Both of the old companies jumped on them and shut them up. It was then becoming apparent that the only way to accomplish anything was to get together and all three companies were merged together as the Electric Storage Battery Co. in 1894.

The engineers in the Consolidated Battery Co., Morris and Salom, wanted something to do. I had not gotten into the Storage Battery Co. then. They told the Storage Battery Co. that something ought to be done in the way of exploiting the electric vehicle and said they would work up this business. That was in 1893.

Meantime, while this get-together movement was going on, I started the Plante company, which sold out in 1895 to the Electric Storage Battery Co. In 1896 or 1897 the Morris and Salom developments crystallized in the Electric Wagon Co., which put into service uptown a dozen cabs and ran them two seasons.

Developing the Electric

The first motive in the development of the electric vehicle was the desire on the part of the storage battery companies to find a market for their product; the second motive was public praise. Everybody wanted to ride in, hire or buy an electric vehicle or buy stock in a company. The Electric Vehicle Co. was organized and put into operation fifty cabs in New York. So popular was the stock that it was hardly possible to organize companies with enough stock to go around without hurting somebody's feelings. There were the New York Transportation Co., the New England, Illinois, Washington and other companies. About $70,000,000 were invested in the industry of which $8,000,000 were paid in cash to the Electric Vehicle Co. The public wanted the electric vehicle.

In 1899 the Pope company, of which I was president, got into the game and bought a plant at Hartford. We put through one order for 1,600 electric cabs. We had about 4,000 other electric vehicles going through the shops at Hartford. This was indeed quantity production for those days. We had not been under way long before we found the product no good. Tires had not been developed; we had only single-tube tires which ran about 200 or 300 miles and other parts were very imperfect. The public's interest in financing the industry was disappointed. Engineering had not all been done, even though we had the money. The industry collapsed in 1900, the companies were liquidated and I got out. That was the end of the second impulse, the impulse from the desire of the public for a motor car.

Then came the dark ages of the business. In 1901 I still felt that there was something in it and wanted to see it through. About that time I met Lucius T. Gibbs, who had some good ideas in regard to electric trucks, and together we backed a company called the Vehicle Equipment Co. and started making electric trucks.

There were in this country at that time 6,000 wagon builders who wanted to get a chassis and then build the body and the rest of the vehicle. So we thought we could build the running gears and the chassis and sell them to the wagon builders. We rented a place in Brooklyn and started forty vehicles. By the time we were ready to dispose of them the wagon builders had changed their minds and we could not sell one of them.

We had to make good, so we developed larger works, went into the wagon business and tried to sell to the trade. That went on for almost 6 years. In 1905, the Vehicle Equipment Co. put out 1,000 vehicles. The company had gone through all sorts of vicissitudes, even bankruptcy, and was reorganized as the General Vehicle Co., but even as late as 1908 we still were in the dark ages. We got lots of sympathy but no co-operation. Finally they talked about an electric vehicle man as somebody who was a little "off." Everybody had lost faith in the electric vehicle. Battery manufacturers did not believe in it. Motor manufacturers, big as they were, gave it up as a bad job. The electric light companies were skeptical.

Tide Turns in 1908

In the early part of 1908 a great many improvements were made in the construction of the vehicle. Better tires, bearings, etc., made it possible to produce electric vehicles which really made good. Letters began to go through the mail regarding the economy and advantages of these wagons over the gasoline truck and the business became an industry. At the end of 1908 the pioneer phase was over.

The next real impulse the business got was from the electric light companies due to their desire to increase the field for consumption of current and that was the last and was really the prime motive in the organization of this society. So you see manufacturers of motors and public utilities have all been working together to make this a success. After the first and second impulse I do not just know how the business got along in the dark ages or what kept it going. Woods, Baker, Studebaker and others hung along, all feeling somewhat discouraged but putting up a hard fight.

I am sure I can predict it; I know it is coming and if we work together in 10 years most of the 60,000 horse vehicles in New York city will be displaced by electric vehicles.

Standardization the Aim of Electric Car Makers

Trend for 1915 Shows Greater Use of Worm Drive—Spiral-Bevel Gears Being Used—Cantilever Springs More in Evidence—Greater Capacity of Motors—Dual Drive Come to Stay

ELECTRIC vehicle manufacturers have been working toward, and have to a great extent attained, partial standardization of electric passenger cars following to some degree in the footsteps of the builders of gasoline cars. There has been marked progress made by electric builders and 1915 points toward greater production by some 20 per cent, more coöperation between maker, dealer and user, lower prices and a general betterment of the cars themselves, with nothing radical in construction.

In the main, the 1915 electric passenger cars are quieter, due to the greater use of worm drive, they are roomier because of the tendency to larger bodies, they are cheaper on the average because of the introduction of new low-priced vehicles and they are finer in appearance because of the general tendency to streamlining the bodies, the influencing factor coming from the gasoline car.

While the progress in design has not been by any means radical the builders of electric cars have endeavored to do more for the dealer and the owner by a system of coöperation attained by organization. The Electric Automobile Manufacturers' Association, while it has been in existence for many years, never has been so active as it is at present, in securing among makers and dealers better cooperation and in preaching better selling methods. This association is composed of the Baker, Detroit, Ohio, Rauch & Lang, Waverley and Woods companies and headed by E. P. Chalfant, has done much good work in the field in helping the dealers become more familiar with ideal selling methods, thereby ultimately gaining what all seek, a minimum of loss through sales and service.

While this organization has been very active the local electric vehicle associations have shown their extreme willingness to bring the electric vehicle industry to a still higher standard and most of these associations have kept the car owner in mind as much as they have their own interests, since the car owner's welfare means much to the dealer, garageman and all connected with the industry.

New Makers in the Field

The field of the electric passenger car has been supplemented by new makers, changes in organizations and consolidation of others. One of the important movements of the year has been the formation of the American Electric Car Co., which is composed of the Borland, Argo and Broc companies, which now sell their vehicles under their name with the word American prefixed.

ELECTRIC TREND FOR 1915

ELECTRIC vehicles for 1915 have roomier bodies, larger battery capacity and are selling at a reduced price on the average.

The use of worm drive has been increased and many makers have adopted a new type of rear axle gear, the spiral-bevel which first was introduced on gasoline cars in 1914.

Cantilever spring suspension has made a good showing.

The motors have been improved so that they now can handle a greater overload and the reductions between motor and rear axle decreased in a number of cases. This has been due to the adoption of worm gears.

Dual drive has come to stay and is in greater use than in 1914.

Lever steer on the inclosed cars holds the lead and more options are given in the matter of battery make, tire type and body fittings.

Five new makers have appeared — Milburn, Columbian, Beardsley, Dudly and Storms —and some of the other concerns have been taken over by new hands.

For the first time an electric is being marketed at the low price of $750.

Three new manufacturers have entered the field, all with cars of either medium or low price. These newcomers are the Milburn Carriage Co., the Columbian Electric Co. and the Storms Electric Co. The last-named concern is marketing a two-passenger roadster at $750, which strikes a very low level for an electric car. The Beardsley, made in Los Angeles, is another new make selling and the latest to the field is the Dudly at $975, made by the Dudly Tool Co., Menominee, Mich.

An important trade deal took place when the Walker Vehicle Co., Chicago, bought the assets of the Chicago Electric Co. and announced it will market three models of Chicago electrics for 1915. It will be remembered the Chicago Electric Co. voluntarily liquidated its business.

In March, 1914, the name of the Tiffany Electric Co., which previously had taken over the assets of the Flanders Mfg. Co., maker of the Flanders electric, changed the name back to the Flanders Electric Co. In this way the Tiffany electric car left the field and the Flanders returned under the same name, but built by a different maker.

The makers in the field during 1914 have turned out approximately 5,000 cars and if present plans are adhered to the coming year will see an increase of 1,000 vehicles over the 1914 figure. With this number on the list the average per company will be about 300 cars.

The list of manufacturers of electric vehicle makers, while it changes from year to year, shows a total in the neighborhood of twenty, each season seeing the coming in of new concerns and the passing of older ones. The past 5 years has witnessed production by thirty-five makers, yet each year there was a falling off of old and a proportionate addition by new makers, until now about twenty remain.

Improvements in Design

Aside from the progress in the business side of the industry, advancement has been made in engineering lines and the greater use of the worm drive probably comes in first place. There has been an increase of over 50 per cent in the number of cars using this type of drive. For the first time spiral-bevel gears have come into use on electric cars. Both worm and the spiral-bevel have been adopted because of their quiet operation as compared with the straight bevel and quietness in inclosed electric cars is an asset. The use of worm drive also has resulted in eliminating gear reductions between motor and rear axle. The use of spiral bevel gears probably has been caused by the use of this type in gasoline passenger cars, the Packard company first having introduced the new drive early in 1914. The concerns using this new drive are Beardsley, Buffalo, Chicago and Century. Those which have changed to the worm drive from the straight bevel or some other type are Woods, and Baker. The chain drive car has but one adherent —the Bailey.

Second in importance to the method of drive comes springing and for the first time electric vehicle makers have considered the cantilever seriously, a summary showing that four makers are using this type. These are the Baker and Buffalo, which use cantilevers in the rear only, and the newcomers, Milburn and Columbian, which use cantilevers both front and rear. Semi-elliptic front and three-quarter elliptic rear is the usual construction, although

practically every type, such as elliptic and platform rear, are to be seen. One rather unusual method of springing has been incorporated in the Woods cars. In this the springs rest not upon the axles but upon radius rods and instead of fastening the springs outside the frame they are attached inside the channel.

Electric motor development for these vehicles has tended toward greater capacity to care for overloading and the use of square-section wire on the armature and ribbon for the fields is in greater use than ever before. This construction allows of more copper being used and hence a more powerful motor, without increasing the overall dimensions. These changes have helped to make the electric more efficient in hill climbing.

More electric cars are using two sets of rear wheel brakes, while the propeller shaft and armature shaft brakes for service are adhered to by about four makers. In the Ohio electric an unusual construction is seen in the form of an electric brake operated by a push button.

Batteries show little in the matter of changes. The thin-plate type, which allows of using a large number of plates per cell, has a large following, while a few have taken to a medium-size plate, neither thick nor thin, with a view to obtaining longer life of the plates. The active material, the lugs, etc., have received no changes on the whole, but in general the capacity of the battery has been increased slightly. Also the wiring from the battery to controller and motor required little change.

While lever steer from the rear still is the leader, the dual drive, which last season was considered only a passing novelty, evidently has come to stay. In this drive the operator may sit either in the front or rear seat, in some cases there being two sets of controls and in others the controls are moved from one position to the other. In this and the rear drive there must be an unobstructed view ahead and to the rear, so that the driver can operate the car without inconvenience. This has caused makers to use more glass, but not too much so as to make the interiors cold.

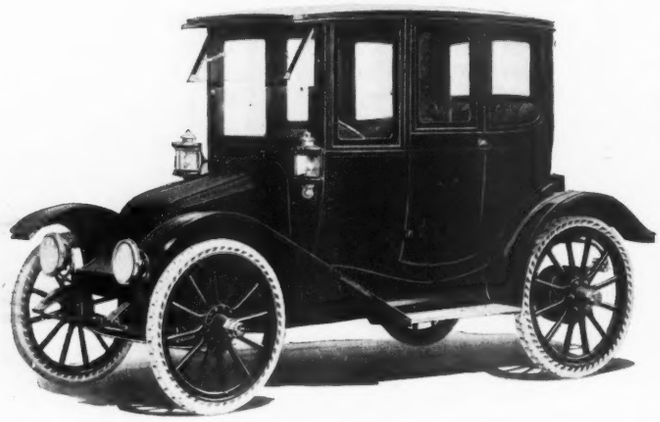
In the matter of interior fittings the plain upholstery seems to be favored, but the tufted variety still has its following. Nothing startling in interior fittings has been introduced, the features of 1914, such as anti-rattlers for the windows, sashless windows, etc., still being used.

SPECIFICATIONS OF ELECTRIC PASSENGER CARS FOR THE SEASON OF 1915

NAME AND MODEL	BODY STYLE	Seats	Price	POSITION OF		Wheel-base	Tires, Kind	BATTERY		Mileage per Charge at 20 M.P.H.	Make of Motor	Final Drive	Forward Speeds
				Steer	Control			Make and No. Cells	Amp.-Hr. Capacity				
American-Argo, B	Roadster	4	$2,350	Wheel	Rear	108½	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
American-Argo, A	Brougham	4	2,650	Wheel	Rear	108½	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
American-Argo, C	Brougham	5	2,800	Wheel	Front	110	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
American-Borland, 52	Roadster	2	2,250	Wheel	Rear	96	Opt	Exide, 42	137½	75-90	Gen. Electric	Bevel	7
American-Borland, 50	Coupe	5	2,550	Lever	Opt	96	Opt	Exide, 40	137½	75-90	Gen. Electric	Bevel	6
American-Borland, 60	Limousine	7	5,500	Wheel	Front	123	Opt	Exide, 42	204	75-90	Gen. Electric	Bevel	6
American-Broc, 33	Brougham	5	3,100	Lever	Rear	96	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
American-Broc, 34	Brougham	5	3,150	Lever	Front	96	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
American-Broc, 36	Brougham	5	3,200	Lever	Double	96	Opt	Exide, 40	137½	75-90	Westinghouse	Bevel	5
Bailey, F	Roadster	2	2,900	Wheel	.....	112	Pneu	Edison, 60	187½	100	Gen. Electric	Chain	6
Bailey, F	Roadster	4	3,300	Wheel	.....	132	Pneu	Edison, 60	225	100	Gen. Electric	Chain	6
Beardsley, 200B	Roadster	3	2,600	Wheel	.....	103	Pneu	Gould, 42	168	90	Westinghouse	Sp. Bevel	5
Beardsley, 300B	Victoria	5	2,750	Lever	Double	103	Pneu	Gould, 36	193	75	Westinghouse	Sp. Bevel	5
Beardsley, 100B	Brougham	5	3,000	Lever	Double	103	Pneu	Gould, 36	193	75	Westinghouse	Sp. Bevel	5
Buffalo, 36	Brougham	5	3,250	Wheel	Front	102	Opt	Opt, 42	140	50	Own	Sp. Bevel	5
Baker, WA & WB	Roadster	2	2,300	Opt	.....	88	Opt	Exide, 34	.....	.....	Gen. Electric	Bevel	6
Baker, VAE	Coupe	4	2,600	Opt	.....	88	Opt	Exide, 34	.....	.....	Gen. Electric	Bevel	6
Baker, DA	Coupe	4	2,800	Opt	.....	90	Opt	Exide, 32	.....	.....	Gen. Electric	Worm	7
Baker, BBD	Brougham	5	3,250	Lever	Double	100	Opt	Exide, 42	.....	.....	Gen. Electric	Worm	6
Century, LB	Brougham	5	3,250	Opt	Opt	104	Opt	Willard, 42	165	85-95	Gen. Electric	Sp. Bevel	4
Chicago, 151 & 153	Brougham	5	2,650	Lever	Rear	96	Cush	Exide, 40	165	70-80	Westinghouse	Sp. Bevel	4
Chicago, 152	Limousine	5	2,850	Lever	Front	104	Cush	Exide, 40	165	70-80	Westinghouse	Sp. Bevel	4
Columbian, R	Roadster	2	950	Lever	Rear	98	Pneu	Opt, 26	135	75-85	Optioual	Worm	5
Columbian, B	Brougham	4	1,450	Lever	Rear	98	Pneu	Opt, 26	135	75-85	Optional	Worm	5
Columbian, C	Coupelette	3	1,250	Lever	Rear	98	Pneu	Opt, 26	135	75-85	Optional	Worm	5
Detroit, 55	Brougham	4	2,600	Lever	Rear	94	Opt	Own, 40	168	70	Own	Bevel	5
Detroit, 50	Cabriolet	4	2,650	Lever	Rear	100	Opt	Own, 42	178	75	Own	Worm	5
Detroit, 51	Brougham	4	2,850	Lever	Rear	100	Opt	Own, 42	178	75	Own	Worm	5
Detroit, 53	Brougham	5	2,950	Lever	Front	100	Opt	Own, 42	178	75	Own	Worm	5
Detroit, 54	Brougham	5	2,950	Lever	Rear	100	Opt	Own, 42	178	75	Own	Worm	5
Detroit, 52	Brougham	5	3,000	Lever	Double	100	Opt	Own, 42	178	75	Own	Worm	5
Dudly	Coupelet	2	975	Wheel	Front	100	Pneu	Exide, 14	.....	45-50	.....	Worm	3
Flanders, K	Colonial	4	1,750	Lever	Rear	100	Pneu	Willard, 30	135	75	Wagner	Worm	6
Grinnell, S	Coupe	5	3,000	Lever	Rear	100	Opt	Own, 40	.....	80	Own	.....	5
Grinnell, R	Brougham	5	3,400	Lever	Double	105	Opt	Phila, 40	.....	.....	Own	.....	5
Milburn, 151	Roadster	3	1,285	Wheel	.....	100	Opt	Phila, 17	205	50-75	Gen. Electric	Worm	4
Milburn, 15	Coupe	4	1,485	Lever	Rear	100	Opt	Phila, 20	180	50-75	Gen. Electric	Worm	4
Ohio, 41	Brougham	5	2,900	Lever	Rear	98½	Opt	Exide, 42	.....	50-85	Own	Opt	5
Ohio, 61	Coupe	5	3,500	Lever	Double	98½	Opt	Exide, 44	.....	50-85	Own	Opt	5
Rauch & Lang, R5	Roadster	2	2,600	Lever	Rear	92	Opt	Exide, 41	130	50-100	Hertner	Worm	6
Rauch & Lang, CR5	Roadster	3	2,800	Lever	Rear	92	Opt	Exide, 41	130	50-100	Hertner	Worm	6
Rauch & Lang, B5	Brougham	4	2,950	Lever	Rear	92	Opt	Exide, 41	130	50-100	Hertner	Worm	6
Rauch & Lang, J5	Brougham	5	3,200	Lever	Double	102	Opt	Exide, 42	130	50-100	Hertner	Worm	6
Rauch & Lang, TC5	Limousine	7	4,000	Wheel	Front	106	Opt	Exide, 41	.....	40-90	Hertner	Worm	6
Standard, M4	Coupe	4	1,990	Lever	Rear	96	Opt	Exide, 32	137½	60-75	Westinghouse	.....	6
Storms	Roadster	2	750	Opt	Front	90	Opt	Opt, 16	.....	.....	.....	Bevel	4
Ward, ES	Coupe	4	2,100	Lever	Front	96	Pneu	Own, 40	180	.....	Gen. Electric	Bevel	4
Waverley, 90	Cabriolet	3	2,250	Wheel	Front	104	Opt	Opt, 34	137	75	Own	Her' b'ne	5
Waverley, 104	Brougham	4	2,900	Lever	Front	106	Opt	Opt, 42	162	75	Own	Her' b'ne	4
Waverley, 109	Brougham	4	3,150	Lever	Rear	106	Opt	Opt. 42	162	50-90	Own	Her' b'ne	4
Waverley, 108	Limousine	5	3,500	Lever	Front	111	Opt	Opt, 42	162	75	Own	Her' b'ne	4
Woods, 1522	Brougham	4	2,850	Lever	Rear	100	Cush	Own, 40	160	80	Own	Worm	5
Woods, 1503	Brougham	5	3,000	Lever	Front	110	Cush	Own, 42	170	80	Own	Worm	5
Woods, 1504	Brougham	5	3,000	Lever	Rear	110	Cush	Own, 42	170	80	Own	Worm	5
Woods, 1501	Brougham	5	3,100	Lever	Double	110	Cush	Own, 42	170	80	Own	Worm	5

ABBREVIATIONS: Opt, optional; Pneu, pneumatic; Her'b'ne, herringbone; Sp. Bevel, Spiral bevel.

Electric Passenger Cars for 1915



Model C American-Argo, a forward drive, five-passenger brougham selling at $2,800. This car has a wheelebase of 110 inches and is fitted with an Exide battery of 40 cells, giving it a milcage of approximately 75 per charge

American-Broc model 36. This is a double-drive, five-passenger car selling at $3,200. It is fitted with an Exide battery and a Westinghouse motor

American-Borland model 50, a rear drive, five-passenger brougham of 96 inches wheelbase. Its price is $2,650 and it is fitted with lever steer

AMERICAN—The American Electric Car Co., Saginaw. Mich., which is the name under which the Argo. Borland and Broc now are manufactured at the three plants in Cleveland, Chicago and Saginaw, is continuing the line for 1915 practically the same as for 1914, except that in such sizes of inclosed cars where there was a duplication, not only in design and size, but in price as well, there has been some curtailment of models.

The complete list of 1915 models consists of: Model A, American-Argo rear drive brougham; model B, American-Argo roadster; model C, American-Argo forward-drive brougham; model 50, American-Borland rear-drive coupe; model 50, American-Borland forward-drive coupe; model 52, American-Borland roadster; model 60, American-Borland limousine; model 33, American-Broc rear-drive brougham; model 34, American-Broc forward-drive brougham; model 36, American-Broc double-drive brougham. Thus it is seen that nearly every type of vehicle may be had in the line.

There are many features of electric car construction, the concern states, that may be varied to meet the different ideas of purchasers without sacrifice of practicability, and with its three factories the company is in position to offer much flexibility of form. For instance, hand or foot control; lever or wheel steer; rear, front or double drive; large cars or those of moderate size; moderate-priced cars and luxurious types of higher price; and body options to take in limousines, coupes or rakish roadsters, are some of the possibilities which the American Electric Co. points out in its extensive list of models.

Baker—For 1915 the Baker Motor Vehicle Co., Cleveland, is marketing four chassis with the leader, a four-passenger coupe, which has either wheel or lever steering and sells at $2,800. The main feature of this coupe it is stated, is that it is of lighter construction as compared with many electrics of the coupe form. This lightness of weight is said to have been brought about by a simpler chassis construction though strength has not been sacrificed.

Due to its low weight the new Baker is claimed to be capable of 23 miles an hour.

Cantilever rear springs and semi-elliptic fronts support the pressed-steel frame, which has a kick-up at the rear to give clearance over the rear axle. There are two sets of internal expanding brakes on the rear wheels, operated independently by two pedals. An automatic circuit breaker cuts off the current when the emergency brake is applied.

Optional tire equipment makes possible the use of either cushion tires of 34 by 4 or special electric pneumatics, 32 by 4.

The seating arrangement is unique in that the front seats are constructed to fold back into recesses in the front of the body, making the car a commodious two-passenger type at will.

The new Baker has a graceful exterior due to the lowering of the body and the long wheelbase. The curves are full and sweeping. Body panels are of aluminum and sashless windows are used throughout. The door windows are operated by mechanical means with lever control.

The upholstery may be had optionally in either blue, green or maroon leather or broadcloth, and the fittings are in accordance with the usual practice in electrics.

Bailey—S. R. Bailey & Co., Amesbury, Mass., is the only electric vehicle concern turning out cars with side-chain drive and for 1915 two models will be marketed, both called roadsters, while the victoria phaeton of 1914 is not listed.

Both 1915 cars use wheel steer and are fitted with a sixty-cell Edison battery which feeds current to a General Electric series-wound motor suspended at the rear and driving a jackshaft by means of a silent chain. Two side-chains from the jackshaft turn the rear wheels. Side-chain drive has been used by this concern for the past 8 years.

The two-passenger roadster model has a unique body resembling, to a great extent, the gasoline roadster types. Its wheelbase is 112 inches, while that of the larger, the four-passenger model, is 132 inches, the longest electric vehicle on the market. The general chassis features of the four-passenger are the same as the two-seater.

Beardsley—Los Angeles, Cal. is responsible for one of the new 1915 electric cars, the Beardsley, brought out by the Beardsley Electric Co. Three models are being marketed, all with practically the same chassis features and so constructed it is claimed, as to be particularly adaptable to the road conditions and climate of California.

The three Beardsleys are: The model 100-B, a five-passenger brougham built with either single or double drive and selling at

$3,000 with the first mentioned equipment, and at $3,100 with the dual fittings; model 300-B, a Victoria model seating five persons and fitted with dual-drive and revolving front chairs, the only electric open car using such construction, and model 200-B, a three passenger open roadster.

All cars are mounted on a 103-inch chassis fitted with Houk wire wheels at no additional cost. The battery is of Gould make and is divided, half being under a hood in front and the remainder in the rear. The drive from the motor is by single reduction using spiral-bevel rear axle gears.

Buffalo—For 1915 the Buffalo Electric Vehicle Co., Buffalo, N. Y., is listing one entirely new chassis, model 36, which is a five-passenger brougham in which all the persons face forward. This car is sold at $3,200, a higher price than that asked for any type offered in 1914.

One feature of the previous cars is retained in the new model, that of mounting the motor on the rear axle, so that only a single gear reduction is necessary. The motor is a specially built one, shunt-wound and governed by a disk controller.

Many options are offered in the matter of body color, upholstery, tires and battery make. A new feature is the use of spiral-bevel rear axle gears.

Century—One chassis model a continuation of the model LB of 1914, but improved, constitutes the Century line of electrics for the coming year. The model, SB a four-passenger closed car is not listed this season. The over-undersluung feature used in 1914 still is to be seen. In this, the front springs are hung under the axle and the rear ones over the axle.

The Century is a dual-controlled car with two sets of handles and brake levers and is one of the few electrics using platform rear spring suspension. Bodies are finished in blue or black and a choice of interior colors is offered, the standard materials being whipcords and Bedfords.

Chicago—Three Chicago electrics, models, 151, 152 and 153 are being marketed by the Walker Vehicle Co., which only a short time ago purchased the assets of the Chicago Electric Car Co., which in the early fall liquidated its business. The 1915 cars are practically the same as those put out in 1914 under the name of Chicago, models 151 and 153 being exactly the same with the exception that the latter has a revolving front seat for one of the passengers instead of a stationary one as in the model 151. Both have seats for five persons. The wheelbase is 96 inches and upon the chassis is mounted a forty-cell Exide battery which supplies current for a Westinghouse, slow-speed, series-wound motor. The motor-to-axle drive is directly by shaft and the axle reduction gears are of the spiral-bevel type. Both cars use lever steer from the rear and are equipped with Firestone, dual-tread, 36 by 4½ tires all around. Wire wheels fitted with Silvertown cord tires optional.

The model 153 is a somewhat larger car of five-passenger capacity. The wheelbase is 104 inches but as far as the mechanical features are concerned, differs little from the other models.

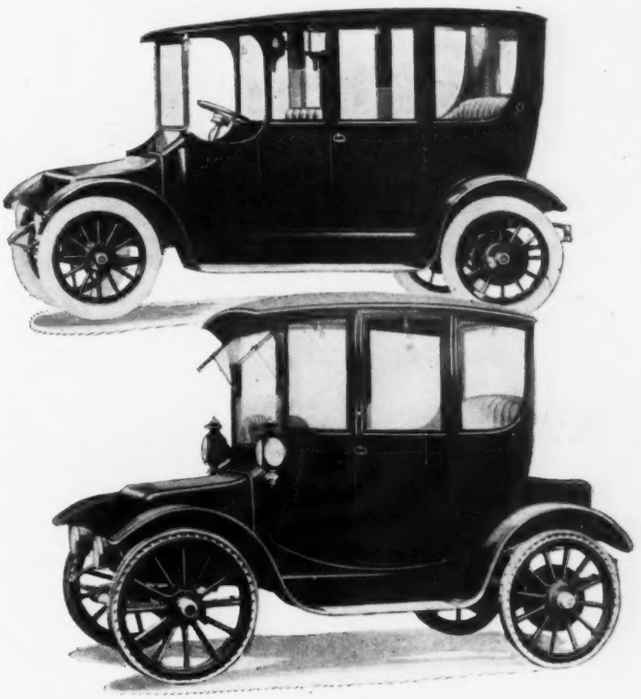
Columbian—The Columbian electrics, a new comer, made by the Columbian Electric Vehicle Co., Detroit, are in three models on the same chassis. These are a two-passenger runabout at $950, a three-passenger coupelet at $1,250 and a brougham at $1,450. The Columbian was the first concern to introduce the electric coupelet, it is stated.

The chassis is propelled by either a Wagner or a General-Electric series-wound motor placed under the seat about amidships of the chassis. A drum type of controller gives five speeds ahead and three reverse, the range ahead being 20, 17.5, 14, 12 and 9 miles per hour. The current source is either a Willard or a Gould battery of 26 cells, 11 plates per cell.

Mechanically-operated service and emergency brakes on the rear axle are employed. The rear axle is three-quarter floating and has a pressed-steel housing. A channel-steel frame and tubular front axle also are constructional points of note.

Detroit—This year the Anderson Electric Car Co., makers of Detroit electrics, offers six new body types, five of which are mounted on a 100-inch chassis with worm drive and one on a 94-inch chassis with bevel drive. The cars on the worm drive chassis with their prices are: model 50, a four-passenger cabriolet, $2,650; model 51, a four-passenger brougham, $2,850; model 53, a five-passenger brougham, $2,950; model 54, a five-passenger brougham at $2,950 and model 52, another five-passenger, at $3,000. The bevel-drive car sells for $2,600 and is known as model 55.

The chief changes in Detroit electrics are: The increase in the number of plates per cell from thirteen to fifteen, the adoption of an electric horn instead of a bell and the fitting of a metal compartment ahead of the motor in which the controller mechanism

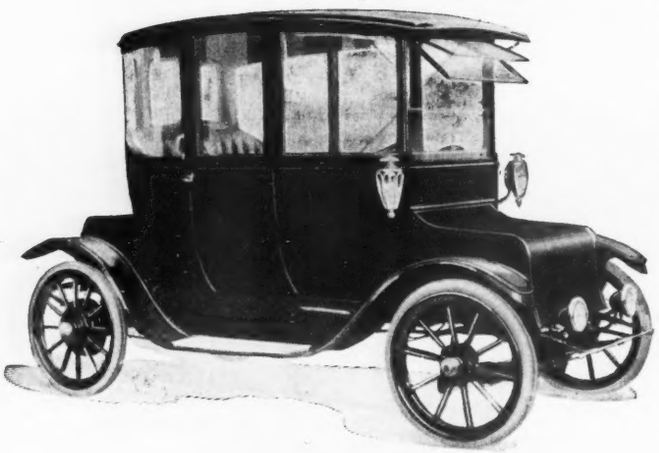


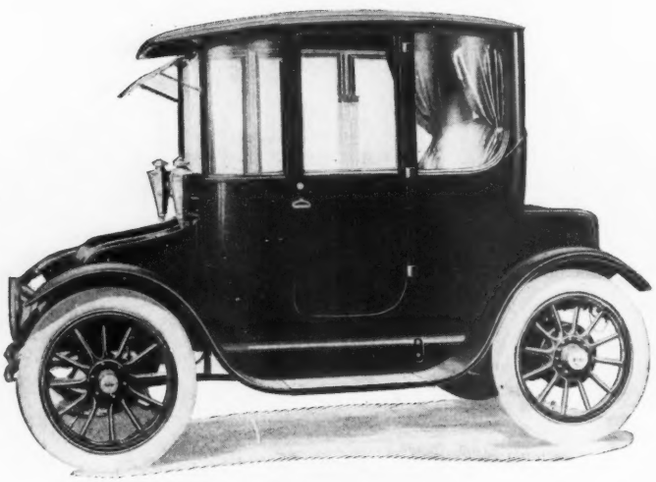
Two 1915 Rauch & Lang electrics, the upper illustration being that of the TC5 town car, a seven-passenger vehicle listing at $4,000. Like all other cars of this make it is fitted with a worm-drive rear axle.

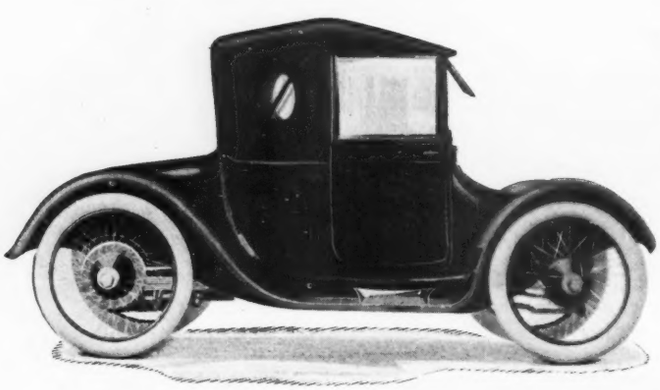
The lower illustration shows the model B5 Rauch & Lang, a four-passenger rear drive brougham with a list price of $2,950

Two of the six new body styles offered by the Anderson Electric Car Co. on its Detroit cars. The left illustration is that of the four-passenger cabriolet model 50. It lists at $2,650 and is fitted with wire wheels as optional equipment

An electric roadster model brought out by the Woods company late last season and which is continued practically unchanged. Notice that it uses one headlight in front and has lever steer.







and armature shaft brake are located. This compartment is accessible through a trap door in the floor of the car. With this feature the entire controller may be removed as a unit through the trap door.

Bodies have been improved by the addition of aluminum drip moulding placed over the doors.

Dudly—This is the latest electric car to be announced and is manufactured by the Dudly Tool Co., Menominee, Mich., in coupelet form, selling at $975. The outward appearance is similar to many of the couplets in the gasoline car field. The Dudly is equipped with a fourteen-cell Exide battery, pneumatic tires 30 by 3½ and a series-wound slow-speed motor.

Flanders—The Flanders electric, which was marketed in 1914 under the name of the Tiffany, is offered for 1915 with no radical changes. The price, however, has been reduced from $2,500 to $1,750. A single model, called the K, with stationary seats for four passengers, two of which face forward and two face the rear, is being marketed. A design peculiar to this car is the location of the motor which is attached to the rear axle and drives directly through worm gearing. This eliminates universals in the drive. The motor used is a Wagner, compound-wound, governed by a drum controller affording six forward and six reverse speeds. Tires are pneumatics, 33 by 4.

Grinnell—The 1915 Grinnell electrics in two models of broughams are practically the same as the 1914 types except for some changes in the bodies which make them roomier and alter their design somewhat. The door windows now are sashless and have mechanical handle lifts rather than straps. These differences and a slight change in the rear axle design tell the story of Grinnell progress.

The feature of the cars of the Grinnell Electric Car Co., Detroit, is the so-called unit transfer control which provides for the swinging of both control lever and steering lever as a unit from a forward to a rear position or vice versa without making any changes save the turning of a handle. There are two sets of pedals, the rear set being shielded by the guard on the back of the front driving seat when the latter is brought into position for driving the car. This double-position control corresponds to dual control in many of the electrics, and is fitted to the larger of the two Grinnell cars.

Grinnells use Diehl slow-speed motors located under the center of the car, and the drive is direct through shaft back to the rear axle with one reduction of 3½ to 1. Overslung elliptic springs are fitted all around and contribute to the easy riding qualities. The service brakes are on the motor, the emergency on the rear wheels.

Milburn—One of the new makers to the field of the electric vehicle is the Milburn Wagon Co., Toledo, O., which is marketing the Milburn car at $1,485 in coupe form, and at $1,250 as a roadster. The chief features of the Milburn are: The light weight which the maker claims for it and the gracefully curved bodies and fenders. Both roadster and coupe, which has a capacity of four persons, are mounted on practically the same worm-drive chassis, the chief difference being that the closed car has lever steer and the roadster a wheel. There are other differences in the matter of battery size and mile-

A new four-passenger 1915 Woods model 1522. The features of this car are its springing and motor suspension. It has a bottom-worm drive and sells for $2,850

Model R Grinnell, a $3,400 five-passenger brougham of 100 inches wheelbase. It has lever steer in the rear

A four-passenger Baker coupe which is made with either wheel or lever steer. It has a worm-drive and sells for $2,800

A newcomer to the electric vehicle field, the Columbian. The illustration shows the coupelet model, which lists at $1,250

age which are brought out in the specification tables shown on a previous page. Tires are Goodyear electrics, 30 by 3½, or Motz cushion, 32 by 3½ at extra cost.

Ohio Electric—Further refinement of body lines and the use of arched fenders, hammered by hand, from one piece of aluminum, are Ohio features for 1915. Ohio has undoubtedly reached a high stage in the body building art in its new models.

Mechanically there is practically no change in the cars which are furnished either with worm drive or spiral-bevel drive in the rear axle, with the shaft running direct from the electric motor and completely inclosed.

An ingenious feature of transmission unit is the fact that the torsion tube is supported between the motor and the rear axle at a point very near to the center of inertia, the idea being to put all the weight of these members on the frame of the car and above the springs.

Ohio electrics use a distinctive control which was brought out last year. Though steering is by a lever, the different speeds are attained by turning a compact hard rubber disk at one side of a small controller head which is provided with a lock to prevent its operation by any other than the owner of the car. There are four forward speeds and three reverse in addition to the magnetic brake and bell button, all operated by parts of this small controller head.

To give an idea of the elaborateness of the interior equipment, two commodious pockets are placed, one on each side of the body instead of in the doors where they would be somewhat in the way. A toilet case slips into a pocket at the side while on the opposite side there is a smoking set.

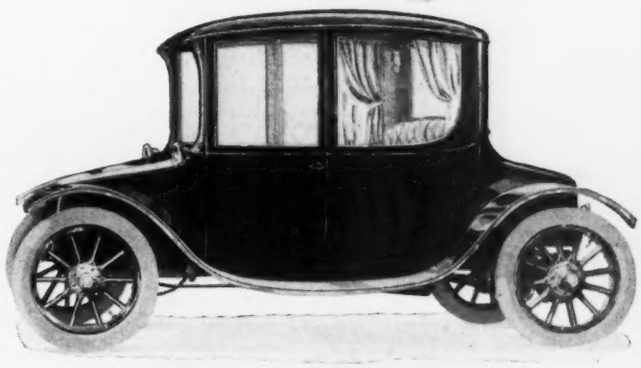
Rauch & Lang—Five chassis, all of worm-drive type, and known as the V series are in the 1915 line of the Rauch & Lang Carriage Company, Cleveland. These range in price from $2,600 for the open roadster model, to $4,000 for the town-car type, and they show no great change other than refinements of details over the cars of 1914. Certain body lines have been lengthened and curves added which give even more grace and beauty. Interior appointments have been made even more refined.

A new coach-built all aluminum body is the greatest change that has been made. The entire rear top paneling is cut from one sheet of aluminum and designed so as to give rigidity to that part which supports the upper rear quarters and the rear glass. The lower part has been built to give flexibility as well as strength. A new window lifting device of handle form operates the sashless windows used on these cars.

According to Rauch & Lang, its trend is toward a larger type of car and with this in view the company has included in its new line four cars of a size somewhat larger than the average electric. These are designated as the BX-5 brougham, the J-5 coach, the TC-5 town car and the TXC-5 town car.

These two town car models at $4,000 have two compartments. the drive part being separated from the interior passenger compartment. The drive is by wheel, and in one there is a roof over the driver's seat while it is unprotected in the other.

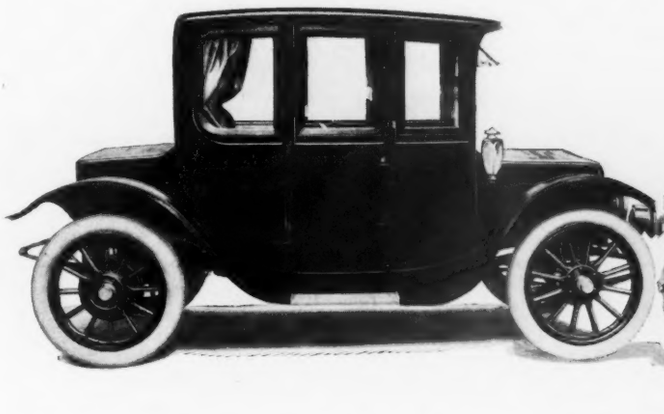
All of these models, however, adhere to the same general chassis design throughout. The drive is of the straight type with the worm mounted over the wheel and incorporated in a floating rear axle. The motor, hung amidships of the frame, drives straight back through a shaft fitted with a universal at either end.



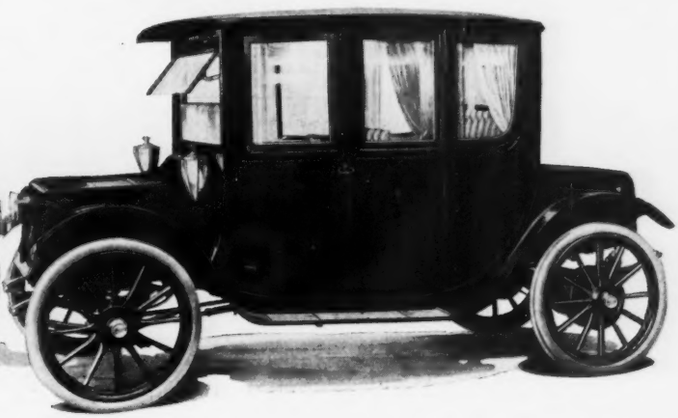
One of the 1915 *Ohio electrics, the model* 41 *brougham. It is a five-passenger car and sells for* $2,900

Model 152 *Chicago electric, a front-drive type selling at* $2,850. *This car now is being made by the Walker Vehicle Co.*

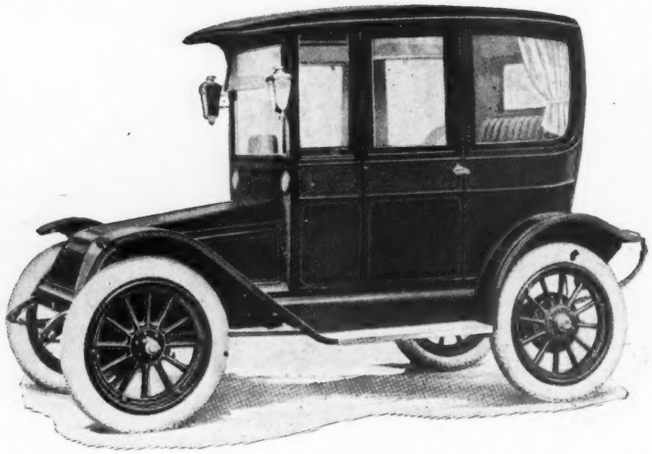
Another newly announced electric, the Milburn, which sells for $1,485 *as a coupe shown*



A low-hung Waverley, model 104, *a forward-drive car with a list price of* $2,900. *The first quarter elliptic springs are visible*



Model 108 *Waverley, a five-passenger limousine with lever steer in front. It is fitted with the characteristic Waverley herringbone drive*



The single model offered by the Ward company for 1915. It is a four-passenger coupe selling at $2,100

The Rauch & Lang Co. employs a motor of its own make which is substantially the same as used for a number of years. It is a comparatively light weight, high-speed type, having four poles with laminated pole pieces and rectangular copper wire windings.

The tire equipment on all models is 33 by 4½-inch special electric pneumatics with the option of solid cushion tires. If these are supplied they are of the 36 by 4½ size on the three heavier cars, models J-5, TC-5 and TXC-5, while the other models carry 36 by 4 cushion tires.

Standard—The chief change in the Standard electric, manufactured by the Standard Car Mfg. Co., Jackson, Mich., has been in increasing the battery size from a thirty-cell Exide to a thirty-two cell of the same make. Other slight changes have been made but the general construction remains unaltered.

This car employs a series-wound Westinghouse motor mounted amidships and driving by shaft to a floating rear axle, by means of two gear reductions.

The Standard body is finished externally with blue paneling and black otherwise, with an interior of gray or blue whipcord or broadcloth. In the seating arrangement three passengers face forward and the fourth faces partially forward. The price, $1,990, is changed as are the tires, lever steer and controller.

Storms—One of the new electric vehicles announced for 1915 is the Storms brought out by the Storms Electric Car Co., Detroit. This car as a roadster sells for $750 and is the lowest price car of its type on the market. Up to this time the specifications of the roadster only, have been made known and this is a two-passenger affair mounted on 90-inch chassis and fitted with a 16-cell lead battery. It is planned to build a coupe also, selling at $950.

Ward—A single chassis with one body type, a five-passenger coupe, is the passenger car program of the Ward Vehicle Co., New York. This car, which sells for $2,100, has a coupe body somewhat like that used on many gasoline cars. The body is mounted to the rear of the battery which is covered by a gracefully-sloping hood. The interior arrangement is such that three persons sit on the rear seat and two on revolving front seats, one of which is used by the driver. The interior finish is in blue broadcloth which has a color value to match the body exterior.

A forty-cell Ward-made battery feeds a motor placed amidships and the drive from the latter is by shaft to a Timken floating axle, fitted with bevel gears. Tires are pneumatic, 34 by 4½ all around, fitted with Brown puncture-proof inner tubes.

Waverley—Four models, including one new brougham, known as

Capacity Classification of 1915 Commercial Electrics

TRUCKS UNDER ½-TON CAPACITY

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase	Battery Make	Ampere-Hour Capacity	Mileage pe Charge With Loa	Final Drive	Feature
Voltacar, A&B	500	.....	68	Edison	158	....	Top wm.	Worm drive
Wagenhals	600	575-c	56	Exide*	165*	25*	Sing chn.	Price
Ward, WJ	750	875-c	88	.....	100	35	S-bevel.	Price
Waverley	600	1,600	87	Opt	165*	50*	Herring.	Herringb. drive

TRUCKS OF ½-TON CAPACITY

Amer.-Argo, K-10	1,000	1,575	86	Exide-Hy	137½	50	Bevel	French hood
Amer.-Argo, L-10	1,000	1,650	86	Exide-Hy	137½	50	Bevel	French hood
Atlantic, 10B&10C	1,000	1,960*	102	Exide-Hy*	.....	.....	Bevel	Platform type
Baker	1,000	1,900	86	Opt	112*	45*	Dbl chn.	Platform type
Beardsley, 10B	1,000	1,900	100	Gould-GC	168	55	Top wm.	Elev. bat. box
C.T., ½	1,000	1,640	90*	Opt	.....	.....	Int-g.	Two motors
Dunlap	1,000	1,250-c	84	Phi., WTX-17	204	60	Dbl chn.	Price
GMC, 1B	1,000	1,200-b	106	Edison, A4*	150*	45*	Dbl chn.	Bat.aboveframe
G.V	1,000	1,700	88½	Own	135	45	Dbl chn.	Platform type
G.V	1,000	1,950	108	Own	135	45	Top wm.	Worm drive
Walker, G	1,000	.....	121	Edison*	.....	.....	Int-g.	Motor in axle
Walker, M	1,000	.....	82*	Edison*	.....	40*	Int-g.	Motor in axle
Ward, EO	1,000	1,250	90	.....	130	45	Dbl chn.	Platform type
Waverley	1,000	1,800	90	Opt	135*	50*	Herring.	Herringb. drive

TRUCKS OF ¾-TON CAPACITY

Urban, 15A	1,500	1,500	86	Exide-Hy	165	40	Dbl chn.	Platform type

TRUCKS OF 1-TON CAPACITY

Amer.-Argo, K-20	2,000	1,720	96	Exide-Hy	165	45	Bevel	French hood
Amer.-Argo, L-20	2,000	1,795	96	Exide-Hy	165	45	Bevel	French hood
Atlantic, 1C	2,000	2,200*	103	Exide-Hy*	.....	.....	Dbl chn.	Platform type
Baker, O	2,000	2,300	102	Opt	140*	40*	Dbl chn.	Platform type
Beardsley, 20B	2,000	2,350	108	Gould-ID	193*	45*	Top wm.	Elev. bat. box
Buffalo, CCA	2,000	2,400	102	Opt	178½*	45*	Spur	Platform type

TRUCKS OF 1-TON CAPACITY—Continued

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase	Battery Make	Ampere-Hour Capacity	Mileage per Charge With Load	Final Drive	Feature
C.T., 1	2,000	2,095	110	Opt	.....	.....	Int-g.	Two motors
GMC, 2B	2,000	1,300-b	118	Edison, A5*	187½*	42*	Dbl chn.	Bat.aboveframe
G.V	2,000	2,100	103	Own	162	45	Dbl chn.	Platform type
Old Hickory, 20W	2,000	1,900	110	Gould	220	40	Top wm.	Worm drive
Walker, K	2,000	.....	94*	Edison*	.....	40*	Int-g.	Motor in axle
Ward, EA	2,000	1,500	99	.....	150	40	Dbl chn.	Platform type
Waverley	2,000	2,150	104	Opt	189*	45*	Dbl chn.	Platform type

TRUCKS OF 1½-TON CAPACITY

GMC, 3B	3,000	1,450-b	130	Edison, A6*	225*	40*	Dbl chn.	Bat.aboveframe
Urban, 30A	3,000	1,900	102	Exide-Hy	165	35	Dbl chn.	Platform type

TRUCKS OF 2-TON CAPACITY

Atlantic, 2C	4,000	2,750*	115½	Exide-Hy*	.....	.....	Dbl chn.	Platform type
Baker, U	4,000	2,800	120	Opt	168*	40*	Dbl chn.	Platform type
C.T., 2	4,000	2,725	116	Opt	.....	.....	Int-g.	Two motors
Detroit	4,000	.....	128	Edison, A8	300	50	Dbl chn.	Platform type
GMC, 4B	4,000	1,650-b	138	Edison, A6*	225*	32*	Dbl chn.	Bat.aboveframe
G.V	4,000	2,600	111½	Own	216	45	Dbl chn.	Platform type
Walker, L	4,000	.....	107*	Edison*	.....	40*	Int-g.	Motor in axle
Ward, EB	4,000	1,900	114	.....	200	35	Dbl chn.	Platform type
Waverley	4,000	3,000	114	Opt	216*	35*	Dbl chn.	Platform type

TRUCKS OF 2½-TON CAPACITY

Urban, 50A	5,000	2,500	118	Exide-Hy	192	35	Dbl chn.	Platform type
Walker, D	5,000	.....	127*	Edison*	.....	40*	Int-g.	Motor in axle

ABBREVIATIONS: General, *, *other options;* Opt, *optional.* **Price,** -c, *complete with body and battery;* -b, *without battery.* **Load Capacity,** -t, *tractor, carries none or only a part of load.* **Battery Make and Type,** Exide-Hy, *Exide Hycap;* Phil, *Philadelphia.* **Drive, Final Reduction,** Dbl chn, *double chain;* Top worm, *worm gear with worm on top;* Spur, *spur gears;* Int-g, *internal gear;* Sing chn, *single chain;* Herring, *herringbone gear;* Vrt worm, *worm gear with worm vertical;* S-bevel, *spiral bevel.*

model 109, comprises the line of Waverley electrics for the 1915 season. The feature of the line is the model 109 which has a four-chair body which allows of the passengers having the maximum of knee, shoulder and elbow room and at the same time an extended range of vision. The new model supercedes the model 107 marketed in 1914 and has as selling mates the models, 104, 105 and 108, which are listed in the specification tables on a previous page, with their main features shown.

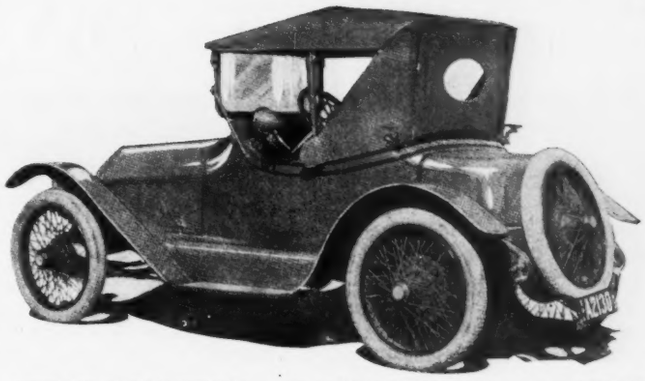
The new Waverley creation has a 106-inch wheelbase and an overall length of 149 inches, of which 131 is taken up by the body. Standard Waverley practice is seen throughout the rest of the car. A feature is the use of five-quarter elliptic springs all around. In this construction an elliptic spring is used with a small portion shackled at the inner end. It gives 33 feet of spring steel distributed between 84 leaves.

The batteries are carried at the front and rear ends of the cars and the flow of current from the battery to the motor is regulated through a knife-blade type of controller.

The motor is suspended from the body just forward of the rear axle and there are two reductions, the first through a silent chain from the armature shaft of the electric motor to a shaft parallel with the rear axle. From the latter shaft the drive is by means of a herringbone gear to the rear axle.

A double set of expanding brakes is used on all Waverley cars. In addition to this the driver has at his disposal a third, and very effective brake on the motor.

Woods—The present season finds the Woods Motor Vehicle Co., Chicago, marketing an entirely new line of electric cars comprising one chassis and four body styles fitted with front drive, rear drive and dual-drive, the latter being new for the Woods company. The spring suspension on 1915 Woods cars is entirely new and original, worm-drive has been adopted, the bodies re-designed and many improvements made in the mechanical construction.



Beardsley electric roadster, a car made in Los Angeles. It is regularly fitted with wire wheels and sells for $2,600

Prices have been reduced as follows: Model 1522, four-passenger brougham, from $2,875 to $2,850; model 1503, five-passenger front-drive brougham, from $3,150 to $3,000; model 1504, rear drive brougham, from $3,150 to $3,000, and model 1501, a five-passenger, dual-drive brougham, from $3,250 to $3,100.

In the new spring suspension, the springs are housed in an inverted, U-shaped frame channel which calls for a different type of frame with the channel portion pointing downward instead of to the side. This method is used for the front springs which now are elliptic, and for the rear also. Another innovation is the mounting of the rear springs, which instead of being fastened to the axle, are rest upon radius rods.

Truck Features, Prices, Etc., of the Leading Makes

TRUCKS OF 3-TON CAPACITY

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase	Battery Make	Ampere-Hour Capacity	Mileage per Charge With Load	Final Drive	Feature
GMC, 6B	6,000	1,900-b	150	Edison, A8*	300*	30*	Dbl chn.	Bat.aboveframe

TRUCKS OF 3½-TON CAPACITY

Atlantic, 3C	7,000	3,375*	134	Exide-Hy*			Dbl chn.	Platform type
Baker, CC	7,000	3,500	137	Opt	224*	40*	Dbl chn.	Platform type
Couple-Gear, H	7,000	4,250	90	U.S.L., WBT	300	35	Bevel4.	4-wheel drive
Couple-Gear, HF	7,000	3,750	120	U.S.L., WBT	325	35	BevelF.	Front-whl drive
C.T., 3½	7,000	3,530	115	Opt			Int-g4.	4-wheel drive
G.V	7,000	3,250	128½	Own	270	40	Dbl chn.	Platform type
Walker, E	7,000		140*	Edison*		40*	Int-g.	Motor in axle
Ward, EC	7,000	2,450	144		275	30	Dbl chn.	Platform type
Waverley	7,000	3,400	127	Opt	270*	35*	Dbl chn.	Platform type

TRUCKS OF 4-TON CAPACITY

GMC, 8B	8,000	2,100-b	156	Edison, A8*	300*	27*	Dbl chn.	Bat.aboveframe
Urban, 80A	8,000	3,000	130	Exide-Hy	275	35	Dbl chn.	Platform type

TRUCKS OF 5-TON CAPACITY

Atlantic, 5C	10,000	3,825*	144	Exide-Hy*			Dbl chn.	Platform type
Baker, EA	10,000	3,850	137	Opt	252*	40*	Dbl chn.	Platform type
Couple-Gear, A	10,000	4,800	90	U.S.L., WBT	350	35	Bevel4.	4-wheel drive
C.T., 5	10,000	3,935	132	Opt			Int-g4.	4-wheel drive
GMC, 10B	10,000	2,350-b	166	Edison, A10*	375*	27*	Dbl chn.	Bat.aboveframe
G.V	10,000	3,700	139	Own	324	35	Dbl chn.	Platform type
Ward	10,000	2,950	174		350	25	Dbl chn.	Platform type
Waverley	10,000	3,950	136	Opt	324*	30*	Dbl chn.	Platform type

TRUCKS OF 6-TON CAPACITY

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase	Battery Make	Ampere-Hour Capacity	Mileage per Charge With Load	Final Drive	Feature
Couple-Gear, AF	12,000		120	U.S.L., WBT	375	35	BevelF.	Front-whl drive
GMC, 12B	12,000	2,500-b	174	Edison, A10*	375*	24*	Dbl chn.	Bat.aboveframe

CAPACITIES NOT GIVEN

Couple-Gear, 3 whl		2,650		U.S.L., WBT	175	30	Bevel.	3-wheeler
Field Bus, 18-pass		6,500-c		Edison, A6	225	100	Top wm.	Mileage per ch.
Field Bus, 38-pass		10,500-c	194	Edison, A10	375	125	Int-g.	Mileage per ch.

ELECTRIC INDUSTRIAL TRUCKS

Automatic, D	2,000		37½	Edison, A4*	150*	30*	Dbl chn.	Opt. bat. loca.
Electromobile, A	3,000	1,400	55	Exide	126		Dbl chn.	Aut.brake lock
Electromobile, C	3,000	1,250	50	Exide	100		Dbl chn.	Aut. brake lock
Electromobile, E	3,000	1,100	43	Exide	100		Dbl chn.	Aut. brake lock
Automatic, E	4,000		52	Edison, A4*	150*	32*	Dbl chn.	Opt. bat loca.
Automatic, M	4,000		72*	Edison, A6*	225*	22½*	Top wm.	Low platform
Cowan Transveyor	4,000	1,650*		Opt	7*	4*	Vrt wm.	Self-loader
Elwell-Parker	4,000		85	Edison, A6*	225*		Int-gF.	Large wheels
Elwell-Parker	4,000		114	Edison, A6*	225*		Int-gF.	Large wheels
Elwell-Parker	4,000		53	Edison, A6*	225*		Int-gF.	Front-whl drive
Elwell-Parker,	4,000		78	Edison, A6*	225*		Int-gF.	Front-whl drive
Elwell-Parker, IB	4,000		52	Edison, B6*	120*		Top wm.	Worm drive
Elwell-Parker, IB	4,000		55	Edison, B6*	120*		Top wm.	Worm drive
Elwell-Parker, ID	4,000		68	Edison, B6*	120*		Top wm.	Worm drive
G.V	2,000	1,250-c	42½	Own	48	25	Spur	Two motors
Hoag.-Thayer, A	4,000	1,500	78	Edison, A6	225	20	Spur	4-wheel steer
Hoag.-Thayer, B	4,000	1,950	84	Edison, A5	187½	20	Spur	4-wheel steer
Hoag.-Thayer, D	4,000	2,025	109	Edison, A5	187½	20	Spur	4-wheel steer
Hunt	4,000		60	Exide*	140*	25*	Int-g.	Int-gear drive
Hoag.-Thayer, MT	10,000	2,900	36	Edison, A6	225	25	Spur	Tractor
Mercury Pullem			38	Opt			Bevel	Tractor

ABBREVIATIONS: General, *, *other options;* Opt, *optional.* **Price,** -c, *complete with body and battery;* -b, *without battery.* **Load Capacity,** -t, *tractor, carries none or only a part of load.* **Battery Make and Type,** Exide-Hy, *Exide Hycap;* Phil, *Philadelphia.* **Drive, Final Reduction,** Dbl chn, *double chain;* Top worm, *worm gear with worm on top;* Spur, *spur gears;* Int-g, *internal gear;* Sing chn, *single chain;* Herring, *herringbone gear;* Vrt worm, *worm gear with worm vertical;* S-bevel, *spiral bevel.*

Electric Trucks for 1915

Thirty-one Different Makes on American Market This Year

ONE dozen new electric commercial vehicles have made their appearance during the past year and five new names have been added to the list of electric truck manufacturers. The designs of 1915 electric trucks differ little from those of the past year except in minor details and refinements.

The greatest strides during the past year have been made by the electric indoor industrial trucks, no fewer than eight makes of which are manufactured for the coming year.

Ninety-one electric commercial vehicles, including the indoor industrial trucks, are listed for 1915. These are manufactured by twenty-five different makers. All of the older standard vehicles are continued for 1915 without radical change.

Interesting new vehicles offered on the 1915 market include a new 5-ton Baker, which follows the same general design of the 1914 models manufactured by the same company; the California-made Beardsley vehicles of ½ and 1-ton capacity whose battery boxes are arranged to elevate from the ground; a new Couple-Gear tractor having three wheels instead of four; a new worm-driven G. V. of 1,000 pounds capacity which has been experimented with for more than a year, but which is offered this year for the first time; two stepless Field buses of eighteen and thirty-eight passengers capacity, respectively; the New York-made Voltacar featured by its low price; the new three-wheeled Wagenhals electric, similar in design to the three-wheeled gasoline vehicles manufactured by the same company; a new 750-pound Ward which sells for $875 complete; a new 600-pound Waverley characterized by its final drive through herringbone gears and following the same general design of the 1,000-pound Waverley model of 1914; a new 1,000-pound Dunlap, and the Urban line which follows closely the construction of the Old Hickory worm-driven gasoline trucks manufactured by the same concern.

The Storms Electric Car Co. was formed in Detroit during the tail-end months of 1914 to engage in the manufacture of electric passenger cars and trucks of 500 pounds capacity to sell at $650.

Companies engaged in the manufacture of electric vehicles during 1914 which are not producing for 1915 are few. The Bailey electric truck has been discontinued for 1915, all Bailey models for this year being of the passenger type. The Borland-Grannis company, which formerly manufactured the Borland electric truck, has been consolidated with other concerns to form the American Electric Car Co. The Anderson Electric Car Co., which formerly offered three truck models of from ½ to 3½-ton capacity, has reduced its line to but one model of 2 tons capacity. The Van Auken electric truck is now known as the Connorsville. The Fritchle, like the Bailey truck, is discontinued, the Fritchle company specializing upon the passenger types. The Tiffany and the Milburn are new makes of passenger chassis which may be purchased with commercial bodies for delivery work.

Of the ninety-one electric trucks offered for 1915, fourteen are of ½-ton capacity, thirteen of 1-ton capacity and nine each of 2 and 3½-ton capacity. The remainder are divided into four of less than ½-ton capacity, one of ¾, two of 1½, two of 2½, one of 3, two of 4, eight of 5, two of 6-ton capacity, three whose capacities are not given and twenty-one indoor industrials.

One-half-ton and 1-ton electric trucks are the most popular for the year of 1915, approximately 33 per cent of all the trucks offered for this year being of these sizes. The final drive of these two sizes is divided into six different kinds. Given in the order of the greatest number using each kind, the trend is as follows: Chain, internal-gear, bevel, worm, herringbone and spur.

SPECIFICATIONS OF THE ELECTRIC COMMERCIAL VEHICLES WHICH HAVE BEEN PLACED ON THE MARKET FOR 1915

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheel-base	TIRES		MOTOR				BATTERY					CONTROL			DRIVE		SPRINGS	
				Front	Rear	Location	Make	Winding	Horse-power	Make, Type and Number Plates	Number Cells	Ampere-Hour Capacity	Number Trays	Location	Mileage per Charge With Load	Steer	Controller	Speeds Forward	First Reduction	Final Reduction	Front	Rear
American-Argo, K-10	1,000	1,575	86	35x3	35x3	Unit-x	West.	Series	3½	Exide-Hy, 11	40	137½	4	Amid-u	50	Wheel-l	Wheel-t	4	Herring	Bevel	½-Ell	½-Ell
American-Argo, L-10	1,000	1,650	86	35x3	35x3	Unit-x	West.	Series	3½	Exide-Hy, 11	40	137½	4	Amid-u	50	Wheel-l	Wheel-t	4	Herring	Bevel	½-Ell	½-Ell
American-Argo, K-20	2,000	1,720	96	35x3½	35x3½	Unit-x	West.	Series	3½	Exide-Hy, 13	40	165	5	Amid-u	45	Wheel-l	Wheel-t	4	Herring	Bevel	½-Ell	½-Ell
American-Argo, L-20	2,000	1,795	96	35x3½	35x3½	Unit-x	West.	Series	3½	Exide-Hy, 11	40	165	5	Amid-u	45	Wheel-l	Wheel-t	4	Herring	Bevel	½-Ell	½-Ell
Atlantic, 10B&10C	1,000	1,960*	102	36x3*	36x3*	Unit-x	G. E.*			Exide-Hy*	44*			Opt		Wheel	Wheel-u	4	Direct	Bevel	½-Ell	½-Ell
Atlantic, 1C	2,000	2,200*	103	34x3½	36x4		G. E			Exide-Hy*	44*			Amid-u		Wheel		4	Chain	Dbl chn	½-Ell	½-Ell
Atlantic, 2C	4,000	2,750*	115½	34x4	36x3d		G. E.			Exide-Hy*	44*					Wheel		4	Chain	Dbl chn	½-Ell	½-Ell
Atlantic, 3C	7,000	3,375*	134	36x5	40x4d		G. E.			Exide-Hy*	44*			Amid-u		Wheel		4	Chain	Dbl chn	½-Ell	½-Ell
Atlantic, 5C	10,000	3,825*	144	36x6	40x5d		G. E.			Exide-Hy*	44*			Amid-u		Wheel		4	Chain	Dbl chn	½-Ell	½-Ell
Automatic, Dt	2,000	.....	37½	16x3	16x3½	Amid	Own	Series	1½	Edison, A4*	20*	150*	2*	Rear-o*	39*	Lever-r	Left	3		Dbl chn	Coil	Coil
Automatic, Et	4,000	.....	52	16x3½	16x3½	Amid	Own	Series	2	Edison, A4*	36*	150*	4*	Rear-o*	32*	Lever-r	Left	3	Direct	Top worm	None	None
Automatic, Mt	4,000	.....	72*	27x3½	27x3½	Unit-x	Own	Series	1½	Edison, A6*	21*	225*	3*	Front-u	22½*	Lever-r	Left	3				
Baker, X	1,000	1,900	86	36x3	36x3½	Unit-j	G.E	Series	3	Opt	42*	112*	6*	Amid-u	45*	Wheel-l	Wheel-u	5	Chain	Dbl chn	½-Ell	½-Ell
Baker, O	2,000	2,300	102	36x3½	36x4	Unit-j	G.E.	Series	4	Opt	42*	143*	6*	Amid-u	41*	Wheel-l	Wheel-u	5	Chain	Dbl chn	½-Ell	½-Ell
Baker, U	4,000	2,800	120	36x4	36x3½d	Unit-j	G.E.	Series	5	Opt	42*	163*	6*	Amid-u	41*	Wheel-l	Wheel-u	5	Chain	Dbl chn	½-Ell	½-Ell
Baker, CC	7,000	3,570	137	36x6	38x4d	Unit-j	G.E.	Series	7	Opt	42*	224*	6*	Amid-u	41*	Wheel-l	Wheel-u	5	Chain	Dbl chn	½-Ell	½-Ell
Baker, EA	10,000	3,850	137	36x7	38x5d	Unit-j	G.E.	Series	10	Opt	42*	252*	6*	Amid-u	43*	Wheel-l	Wheel-u	5	Chain	Dbl chn	½-Ell	½-Ell
Beardsley, 10B	1,000	1,900	100	34x4	34x4½	Amid-o	West.	Series	2½	Gould-GC, 13	40	168	8	Amid-u	55	Wheel-l	Seat-l	4	Direct	Top worm	½-Ell	½-Ell
Beardsley, 20B	2,000	2,350	108	34x4½	34x5	Amid-o	West.	Series	3	Gould-ID, 15	40*	193*	10*	Amid-u	45*	Wheel-l	Seat-l	4	Direct	Top worm	½-Ell	½-Ell
Buffalo, CCA	2,000	2,400	102	36x3½	36x5	Amid	G.E.	Series	2½	Opt., 15	44*	178½*	10*	Amid-u	45*	Wheel-l	Seat-l	5	Bevel	Spur	½-Ell	½-Ell
Couple-Gear, 3-wheel	2,000	2,650	90	36x4d	36x4d	F-wheel	Own	Series	5	U.S.L., WBT-15	40	175	4	Amid-u	30	Wheel-r	Seat-l	5	Direct	Bevel	Coil	½-Ell
Couple-Gear, H	7,000	4,250	90	36x4d	36x4d	In whls4	Own	Series	3	U.S.L., WBT-25	44	300	8	Amid-u	35	Wheel-r	Seat-l	5	Direct	Bevel4	½-Ell	½-Ell
Couple-Gear, HF	7,000	3,750	120	36x4d	64x5s	In whlsF	Own	Series	3	U.S.L., WBT-27	40	325	4	Amid-u	35	Wheel-r	Seat-l	5	Direct	Bevel4	½-Ell	½-Ell
Couple-Gear, A	10,000	4,800	90	36x5d	36x5d	In whls4	Own	Series	5	U.S.L., WBT-29	44	350	8	Amid-u	35	Wheel-r	Seat-l	5	Direct	BevelF	½-Ell	½-Ell
Couple-Gear, AF	12,000	.....	120	36x5d	66x5s	In whlsF	Own	Series	5	U.S.L., WBT-31	40	375	6	Amid-u	35	Wheel-r	Seat-l	5	Direct	BevelF	½-Ell	½-Ell
Cowan Transveyor	4,000	1,650*				Front-o	Wagner		2	Opt	15*	7*		Front-o	4*	Wheel-l	Right	3	Direct	Vrt worm	None	None

Couple-Gear, AF	12,000		120	36x5d	66x5s	In whlsF.	Own	Series	5	U.S.L., WB1-31	40	375	6	Amid-u.	35	Wheel-r.	Seat-l.	5	Direct	BevelF.	½-Ell	½-Ell
Cowan Transveyor†	4,000	1,650*				Front-o	Wagner		2	Opt	15*	7*		Front-o.	4*	Wheel-l.	Right	3	Direct	Vrt worm	None	None
C.T., ½	1,000	1,640	90*	36x2½	36x3	Unit-x2	G.E.	Series	1½	Opt	42*			Amid-u.		Wheel-l.	Wheel-u	4	Bevel	Int-g	½-Ell	½-Ell
C.T., 1	2,000	2,095	110	36x3½	36x4	Unit-x2	G.E.	Series	1½	Opt	42*			Amid-u.		Wheel-l.	Wheel-u	4	Bevel	Int-g	½-Ell	½-Ell
C.T., 2	4,000	2,725	116	36x5	36x3½d	Unit-x2	G.E.	Series	2½	Opt	42*			Amid-u.		Wheel-l.	Wheel-u	4	Bevel	Int-g	½-Ell	½-Ell
C.T., 3½	7,000	3,530	115	36x3½d	36x4d	Unit-x4	G.E.	Series	1½	Opt	42*			Amid-u.		Wheel-l.	Wheel-u	4	Bevel	Int-g4	½-Ell	½-Ell
C.T., 5	10,000	3,935	132	36x4d	36x5d	Unit-x4	G.E.	Series	1¾	Opt	42*			Amid-u.		Wheel-l.	Wheel-u	4	Bevel	Int-g4	½-Ell	½-Ell
Detroit	4,000		128	36x4	36x3½d	Amid	Own	Series	6	Edison, A8	60	300	12	Amid-u.	50	Wheel-l.	Wheel-u	5	Bevel	Dbl chn	½-Ell	½-Ell
Dunlap	1,000	1,250-c	84	30x2	30x2	Rear	G.E.	Series		Phil., WTX-17	26	204	4	Amid-u.	60	Lever-r.	Center	5	Chain	Dbl chn	Ellip	Ellip
Electromobile, E†	3,000	1,100	43	20x3	20x3	Unit-j	Wagner	Series	2½	Exide, 9	15	100	1	Amid-u.		Lever-r.	Left	4	Chain	Dbl chn	Coil	Coil
Electromobile, C†	3,000	1,250	50	20x3	20x3	Unit-j	Wagner	Series	2¾	Exide, 9	24	100	2	Amid-u.		Lever-r.	Left	4	Chain	Dbl chn	Coil	Coil
Electromobile, A†	3,000	1,400	55	20x3	20x3	Unit-j	Wagner	Series	4	Exide, 9	30	126	2	Amid-u.		Lever-r.	Left	4	Chain	Dbl chn	Coil	Coil
Elwell-Parker†	4,000		85	27½x3½	27½x3½	Unit-x	Own	Series		Edison, A6*	21*	225*	3*	Amid-u.		Lever-r.	Left	3	Spur	Int-g, F	None	None
Elwell-Parker†	4,000		114	27½x3½	27½x3½	Unit-x	Own	Series		Edison, A6*	21*	225*	3*	Amid-u.		Lever-r.	Left	3	Spur	Int-g, F	None	None
Elwell-Parker†	4,000		53	21½x3½	10½x5	Unit-x	Own	Series		Edison, A6*	21*	225*	3*	Amid-u.		Lever-r.	Left	3	Spur	Int-g, F	None	None
Elwell-Parker†	4,000		78	21½x3½	15x3½	Unit-x	Own	Series		Edison, A6*	21*	225*	3*	Amid-u.		Lever-r.	Left	3	Spur	Int-g, F	None	None
Elwell-Parker, IB†	4,000		52	15x3½	15x3½	Unit-x	Own	Series		Edison, B6*	42*	120*	6*	Amid-u.		Lever-r.	Left	3	Direct	Top worm	None	None
Elwell-Parker, IB†	4,000		55	15x3½	15x3½	Unit-x	Own	Series		Edison, B6*	42*	120*	6*	Amid-u.		Lever-r.	Left	3	Direct	Top worm	None	None
Elwell-Parker, ID†	4,000		68	15x3½	15x3½	Unit-x	Own	Series		Edison, B6*	42*	120*	6*	Amid-u.		Lever-r.	Left	3	Direct	Top worm	None	None
Field Bus, 18-pass		6,500-c		32x3½	34x3½d	Unit-x	G.E.	Series	10	Edison, A6	110	225		H&s	100	Wheel-l.	Left	7	Direct	Top worm	Ellip	Ellip
Field Bus, 38-pass		10,500-c	194	36x5	38x5d	Unit-x2	G.E.	Series	10	Edison, A10	115	375	23	Rear-o	125	Wheel-l.	Left	7	Spur	Int-g	Ellip	Ellip
G.M.C., 1B	1,000	1,200-b	106	32x3	32x3½	Rear	G.E.	Series	2½	Edison, A4*	60*	150*		U-seat	45*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 2B	2,000	1,300-b	118	32x3½	32x4	Rear	G.E.	Series	3½	Edison, A5*	60*	187½*		U-seat	42*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 3B	3,000	1,450-b	130	32x4	32x5	Rear	G.E.	Series	4	Edison, A6*	60*	225*		U-seat	40*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 4B	4,000	1,650-b	138	32x4	36x3½d	Rear	G.E.	Series	4	Edison, A6*	60*	225*		U-seat	32*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 6B	6,000	1,900-b	150	32x5	36x4d	Rear	G.E.	Series	5½	Edison, A8*	60*	300*		U-seat	30*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 8B	8,000	2,100-b	156	32x5	36x5d	Rear	G.E.	Series	5½	Edison, A8*	60*	300*		U-seat	27*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 10B	10,000	2,350-b	166	36x6	36x6d	Rear	G.E.	Series	7	Edison, A10*	60*	375*		U-seat	27*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.M.C., 12B	12,000	2,500-b	174	36x6	36x7d	Rear	G.E.	Series	7	Edison, A10*	60*	375*		U-seat	24*	Wheel-l.	Wheel-t.	5	Bevel	Dbl chn	½-Ell	½-Ell
G.V	1,000	1,700	88½	36x2½	36x2½	Amid	G.E.	Series		Own, 11	44	135	4	Amid-u.	45	Wheel-l.	Center	5	Chain	Dbl chn	½-Ell	½-Ell
G.V	1,000	1,950	108	36x3	36x3	Amid	G.E.	Series		Own, 11	44	135	4	U-hood	45	Wheel-l.	Center	5	Direct	Top worm	½-Ell	½-Ell
G.V	2,000	2,100	103	36x3½	36x3½	Amid	G.E.	Series		Own, 13	44	162	4	Amid-u.	45	Wheel-l.	Center	5	Chain	Dbl chn	½-Ell	½-Ell
G.V†	2,000	1,250-c	42½	20x2½	20x2½	Unit-x2	G.E.	Series		Own, 5	44	48	1	Amid-u.	25	Lever-r.	Left	3	Direct	Spur	Coil	Coil
G.V	4,000	2,690	111½	36x4	36x4	Amid	G.E.	Series		Own, 17	44	216	6	Amid-u.	45	Wheel-l.	Center	5	Chain	Dbl chn	½-Ell	½-Ell
G.V	7,000	3,250	128½	36x6	36x4d	Amid	G.E.	Series		Own, 21	44	270	6	Amid-u.	40	Wheel-l.	Center	5	Chain	Dbl chn	½-Ell	½-Ell
G.V	10,000	3,700	139	36x7	36x5d	Amid	G.E.	Series		Own, 25	44	324	6	Amid-u.	35	Wheel-l.	Center	5	Chain	Dbl chn	½-Ell	½-Ell
Hoagland-Thayer, A†	4,000	1,500	78	20x3½	15x3½	Unit-x	G.E.	Series	1	Edison, A6	21	225	3	Front-o.	20	Lever-r.	Left	3	Spur	Spur	None	None
Hoagland-Thayer, B†	4,000	1,950	84	24x3½	24x3½	Unit-x	G.E.	Series	1½	Edison, A5	30	187½	5	Amid-u.	20	Lever-r.	Left	3	Spur	Spur	None	None
Hoagland-Thayer, D†	4,000	2,025	109	24x3½	24x3½	Unit-x	G.E.	Series	1½	Edison, A5	30	187½	5	Rear-u	20	Lever-r.	Left	3	Spur	Spur	None	None
Hoagland-Thayer, MT†	10,000-t	2,900	36	20x3½	20x3½	Unit-x2	G.E.	Series	2	Edison, A6	48	225	6	Amid-o.	25	Lever-r.	Left	3	Spur	Spur	None	None
Hunt†	4,000		60	20x3½	20x3½	Unit-x	Diehl	Series	1¾	Exide, MV-11*	20*	140*	4*	Amid-u.	25*	Lever-r.	Left	3	Spur	Int-g	None	None
Mercury Pullem†			38	15x3½	21x3½	Amid-u			2	Opt				Rear-c		Lever-c.	Right	4	Spur	Bevel	None	None
Old Hickory, 20W	2,000	1,990	110	33x3½	33x4	Amid	West*	Series		Gould, 17	32	220	4	Amid-u.	40	Wheel-l.	Left	4	Direct	Top worm	½-Ell	½-Ell
Urban, 15A	1,500	1,500	86	36x3	36x3	Amid	G.E.	Series		Exide-Hy, 13	30	165	6	Amid-u.	40	Wheel-l.	Wheel-u	4	Chain	Dbl chn	½-Ell	½-Ell
Urban, 30A	3,000	1,900	102	36x3½	36x5	Amid	G.E.	Series		Exide-Hy, 13	44	165	6	Amid-u.	35	Wheel-l.	Wheel-u	4	Chain	Dbl chn	½-Ell	½-Ell
Urban, 50A	5,000	2,500	118	36x4	36x4d	Amid	G.E.	Series		Exide-Hy, 15	44	192	6	Amid-u.	35	Wheel-l.	Left	4	Chain	Dbl chn	½-Ell	½-Ell
Urban, 80A	8,000	3,000	130	36x5	40x5d	Amid	G.E.	Series		Exide-Hy, 21	44	275	8	Amid-u.	35	Wheel-l.	Wheel-u	4	Chain	Dbl chn	½-Ell	½-Ell
Voltacar, A&B	500		68	30x2	30x2	Amid	G.E.			Edison, 11*	24*	158*	3	U-seat		Wheel-l.	Wheel-u	4	Direct	Top worm	Ellip	Ellip
Wagenhals	600	575-c	56	28x2	30x2½	Rear	G.E.	Shunt		Exide, 13*	14*	165*	2*	Amid-o.	25*	Wheel-c.	Left	4	Spur	Sing chn	½-Ell	½-Ell
Walker, G	1,000		121	34x3	36x3½	Unit-x	West	Series		Edison*	60*			Amid&h		Wheel-l.	Left	5	Spur	Int-g	½-Ell	½-Ell
Walker, M	1,000		82*	34x3	36x3½	Unit-x	West	Series		Edison*	60*			Amid-u.	40*	Wheel-l.	Left	5	Spur	Int-g	½-Ell	½-Ell
Walker, K	2,000		94*	34x3½	36x4	Unit-x	West	Series		Edison*	60*			Amid-u.	40*	Wheel-l.	Left	5	Spur	Int-g	½-Ell	½-Ell
Walker, L	4,000		107*	38x4	38x5	Unit-x	West	Series		Edison*	60*			Amid-u.	40*	Wheel-l.	Left	5	Spur	Int-g	½-Ell	½-Ell
Walker, D	5,000		127*	36x5	36x3½d	Unit-x	West	Series		Edison*	60*			Amid-u.	40*	Wheel-l.	Left	6	Spur	Int-g	½-Ell	½-Ell
Walker, E	7,000		143*	36x6	38x4d	Unit-x	West	Series		Edison*	60*			Amid-u.	40*	Wheel-l.	Left	6	Spur	Int-g	½-Ell	½-Ell
Ward, WJ	750	875-c	88	32x2½	32x2½	Amid	West	Series	2			100	3	U-seat	35	Wheel-l.	Wheel-u	4	Direct	S-bevel	½-Ell	½-Ell
Ward, EO	1,000	1,250	90	32x2½	34x6	Rear		Series			42	130		Amid-u.	45	Wheel-l.	Seat-l	4	Chain	Dbl chn	½-Ell	½-Ell
Ward, EA	2,000	1,500	99	34x3	36x4	Rear		Series			42	150		Amid-u.	40	Wheel-l.	Seat-l	4	Chain	Dbl chn	½-Ell	½-Ell
Ward, EB	4,000	1,900	114	36x4	38x6	Rear		Series			42	200		Amid-u.	35	Wheel-l.	Seat-l	4	Chain	Dbl chn	½-Ell	½-Ell
Ward, EC	7,000	2,450	144	38x6	40x3½d	Rear		Series			42	275		Amid-u.	30	Wheel-l.	Seat-l	4	Chain	Dbl chn	½-Ell	½-Ell
Ward	10,000	2,950	174	40x3½d	42x5d	Rear		Series			42	350		Amid-u.	25	Wheel-l.	Seat-l	4	Chain	Dbl chn	½-Ell	½-Ell
Waverley	600	1,600	87	32x2½	32x2½	Rear	Own	Series	3½	Opt	28*	165*		Amid-u.	50*	Wheel-l.	Seat-l	4	Chain	Herring	Ellip	Ellip
Waverley	1,000	1,800	90	34x2½	34x2½	Rear	Own	Series	4	Opt, 11*	42*	135*		Amid-u.	50*	Wheel-l.	Seat-l	4	Chain	Herring	Ellip	Ellip
Waverley	2,000	2,150	104	35x4	35x5	Rear	G.E.	Series	4½	Opt, 15*	42*	189*		Amid-u.	45*	Wheel-l.	Seat-l	4	Bevel	Dbl chn	½-Ell	½-Ell
Waverley	4,000	3,000	114	37x5	37x4d	Rear	G.E.	Series	5	Opt, 17*	42*	216*		Amid-u.	35*	Wheel-l.	Seat-l	4	Bevel	Dbl chn	½-Ell	½-Ell
Waverley	7,000	3,400	127	37x6	37x5d	Rear	G.E.	Series	6	Opt, 21*	42*	270*		Amid-u.	35*	Wheel-l.	Seat-l	4	Bevel	Dbl chn	½-Ell	½-Ell
Waverley	10,000	3,950	136	37x7	37x7d	Rear	G.E.	Series	6	Opt, 25*	42*	324*		Amid-u.	30*	Wheel-l.	Seat-l	4	Bevel	Dbl chn	½-Ell	½-Ell

† Indicates indoor vehicles.

ABBREVIATIONS: **General**, *, *other options*. Opt, *optional*. **Price**, -c, *complete with body and battery*. -b, *without battery*. **Load Capacity**, -t, *tractor, carries none or only a part of load*. **Tires**, d, *dual*. s, *steel*. **Motor Location**, Unit-x, *unit with axle*. Unit-j, *unit with jackshaft*. Amid, *amidships*. F-wheel, *in front wheel*. Rear, *suspended from rear of frame*. -2, *two motors used*. -4, *four motors used*. -f, *motor located so that it drives front wheels*. **Horsepower**, *is for single motors, where two or more motors are used, it represents the power of each*. **Battery Make, Type and Number of Plates**, Exide-Hy, *Exide Hycap*. Phil, *Philadelphia*. **Battery Location**, Amid-u, *amidships underslung*. Amid-o, *amidships over frame*. Amid&h, *amidships over frame and under hood*. Rear-o, *to the rear, over frame*. Rear-u, *to the rear, under frame*. Front-u, *at the front, under frame*. Front-o, *at the front, over frame*. U-hood, *under hood*. H&s, *under hood and under seats*. U-seat, *under seat*. **Steer**. Wheel-l, *wheel on the left side*. Wheel-r, *wheel on the right side*. Lever-l, *lever on the left side*. Lever-r, *lever on the right side*. Wheel-c, *wheel in center*. **Controller**, Wheel-t, *on top of steering wheel*. Wheel-u, *under steering wheel*. Seat-l, *to the left of seat*. Seat-r, *to the right of seat*. **Drive, First Reduction**, Herring, *herringbone gears*. Direct, *only one reduction*. Spur, *spur gear*. **Drive, Final Reduction**, Dbl chn, *double chain*. Top worm *worm gear with worm on top*. Spur, *spur gears*. Int-g, *internal gear*. Sing chn, *single chain*. herringbone, *herringbone gear*. Vrt worm, *worm gear with worm vertical*. S-bevel, *spiral bevel*. **Springs**, ½-Ell, *half-elliptic*. Ellip, *elliptic*. ¾-Ellip, *three-quarters-elliptic*. Plat, *platform*.

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Progress in the Accessory Field

THE accessories for this year excel those of previous years in several respects, notably in that they are simpler and also that accessibility has been looked after and better protection against the weather kept in mind. Increased efficiency is shown in practically every line of devices, and improved workmanship and better materials are found in a majority of the devices on the American market.

AS great activity has been shown in the electrical specialties as in any other department. Although many considered that magnetos had reached a perfected stage a year or so ago, there scarcely is a manufacturer among the leaders who has not incorporated many improvements in his new line. These improvements have to do with increased electrical efficiency largely such as using stronger magnets, improving the armatures so that greater current will be generated, and also improving the shape of the pole piece so a hot spark is obtained when the motor is turning over at very slow speeds, this being a very desirable condition because of electric starters and the cold winter weather to which the majority of the country is subjected. Undoubtedly this last feature will be appreciated by all motorists.

BUT the story of magneto improvement goes farther: Much effort has been spent in getting a better water-proof design, one in which the magnets are entirely inclosed, and also in which the breaker-box and distributor are protected against water. Hand in hand with such improvements are those in the cause of accessibility and by means of which a ready inspection of the instrument can be made in a very brief time and without much trouble for the man doing the work.

SELF-STARTERS of the electric type have undergone a very careful revamping during the past 12 months, and it is remarkable how much the manufacturers have accomplished in the way of reducing the weight of both the starter and the generator, reducing the overall dimensions of these, and also increasing the electrical efficiency so that a small starting motor will crank a gasoline engine at higher speeds than the larger motors of a year ago. This has been accomplished by improvements in the winding of the fields and armature and also by other means. This, too, means much for the simplification of motoring generally.

THERE is shown a pronounced tendency of makers of starters and generators to produce whatever the manufacturer desires, either a single-unit system, in which starting, lighting and ignition are combined; a two-unit system in which the starter and generator are in one, with the ignition separate; and the three-unit system in which all three functions, namely, ignition, starting and lighting are separated. Concerns which a year ago manufactured only one type are this year building all three; in other words, the year has shown that the starter movement is more and more becoming a question of starting with the manufacture of cars, rather than building to meet the used-car trade. There are very few concerns that are specializing on the universal starter, that is, one that can be applied to many makes of used cars, for the reason that the manufacturer himself is attending to this before the car goes on the market.

IN the carbureter realm, improvements are not so conspicuous as in the ignition field, although careful scrutiny shows that the majority of the leading carbureter makers have added many refinements during the year. The horizontal type of carbureter has been one of the developments of the year, its advent being accelerated by the block-cast motor and also by the vacuum-gravity system of fuel feed. The horizontal carbureter is intended to bolt directly to the side of the engine block, thus eliminating the manifold entirely. This has its advantages in that it brings the carbureter up where it is very accessible, it removes the possibility of condensation in the manifold, and results in greater fuel efficiency. Where concerns have not developed along this special line, improvements have been brought out in the way of evolution of the auxiliary air valve and in some cases improvements in the nozzle and also the float operating parts. The carbureter manufacturer is keeping abreast of the times, it is evident.

IN the varied accessory field improvements have been very general. Thus in the spark plug zone, the one-piece construction is a characteristic of the year. This construction has not a few advantages, among which might be noted the preventing of the car owner from needlessly tinkering with the spark plug, taking it apart to clean the insulation, or some other part of it, and perhaps cracking the insulation and injuring the plug. With spark plugs the best policy is to leave them alone. The priming plug has made marked progress during the year, this being largely due to smaller motors of the L-type in which there is less space for inserting priming plugs, so causing a demand for this kind of plug.

NOTHING short of an avalanche of spring-assisting devices has descended on the industry in the last year. These are largely spiral spring combinations with similar functioning. The standard shock-absorber field has made little increase in numbers, although improvements in design have been forthcoming in this department.

FROM the standpoint of the car-owner the accessories of 1915 should prove much more serviceable than those of past years, not because of the various improvements mentioned above, but also because designers of these accessories have had the car-owner more in mind. The movement of producing the accessories for one make of car has during the past 2 years had a very desirable effect in that it has developed the thought of making an accessory that can be fitted on the car without a great expenditure of money. In the past it was not uncommon to have an accessory which it cost as much to attach to the car as you originally paid for it. Fortunately, the old is giving way to the new in this respect and now the owner can buy new accessories which can be fitted to his car without drilling the frame, buying new leaves for the springs, and otherwise interfering with the general makeup of his machine. The accessory maker has been careful to guard against these points and he has succeeded.

War Brings About the Widening of French Roads

Army Transports Demand More Room on Highways

PARIS, Dec. 29—French national highways, leading from base depots to main points along the fighting lines, are being widened by the military authorities in order to facilitate the work of the army transports. Practically all French macadam roads are flanked by grass tracks, sometimes as wide as the road itself, on which trees have been planted at regular intervals. These tracks give pasturage to cattle when on the move and the trees act as a protector against sun and wind. Owing to the immense amount of traffic on the main roads, the grass tracks have been used by men and horses, leaving the center free for motor car convoys, until, instead of a smooth, trim grass surface, there is nothing more than a bed of mud for the motor cars.

The military authorities, taking the work out of the hands of the department of roads and bridges, is now making the side tracks fit for traffic. Stakes are driven into the road and over these are placed wood beams or old railroad sleepers, laid longitudinally. Logs are placed crosswise above the sleepers, at regular intervals of about 5 feet. A heavy layer of broken stone and sand is spread over this wood framework. The surface thus obtained is found very satisfactory for horse convoys. It leaves the main macadamized portion entirely free for motor traffic, comprising heavy convoys, fast touring cars and troops being moved in buses and trucks.

The work of transforming the roads is being undertaken by the engineer corps in the army and by territorial troops who are officially considered to be resting; in other words, who are not in the actual firing line.

FRANCE COUNTS MOTOR STRENGTH

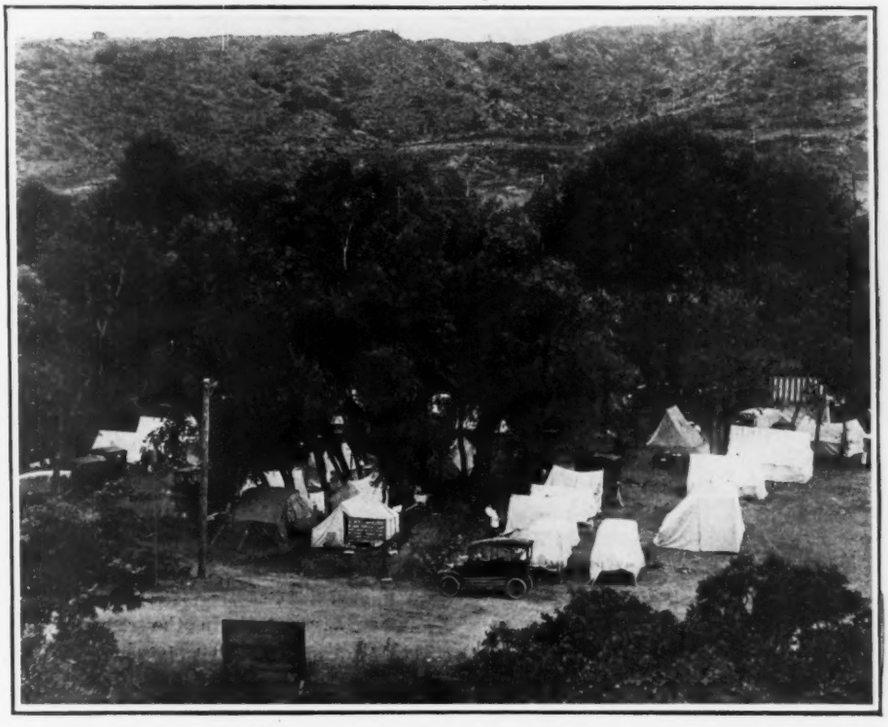
Paris, Dec. 28—After suspending the requisitioning of motor cars for a few weeks the army authorities now are making a census of all touring cars in France with a view to ascertaining the resources of the country. Special facilities are being offered men who are not eligible for service in the army to join the motor corps. There must be thousands of motorists not suitable physically for a place in a line regiment, or not having been called up because the army had no present use for them, who could render excellent service in the motor brigade. Such men are being encouraged to join voluntarily. All men entering this corps must possess the government driving license, and in addition have to pass a test to show that they understand various makes of vehicles.

Plans are being carried out on a large scale for the transformation of touring cars into wagonnettes capable of moving eight men and their equipment. The body is a very simple type; it is being fitted to existing open cars, while closed cars are retained for officers' use. The English have made similar arrangements by the importation of hundreds of motor buses transformed into single-deckers.

These arrangements evidently are being carried out in anticipation of a general advance of the allied troops. As the Germans will destroy all railroads on retreating, the importance of the motor car will be greater than ever when the inevitable forward movement of the allies is begun. The Germans, in their scheme for a high-speed trip to Paris, realized to the full the value of the motor car, and by its use were able to harass seriously the retreating allies. Now that the time is almost ripe for the allies to move forward in a mass, the motor invasion has been prepared on an even bigger scale.

As a result of protests, the French financial department has decided to pay cash, when desired, for all requisitioned cars. At the outbreak of the war owners were given treasury bonds redeemable after the war, while the proprietors of horses and carts could draw cash. Under the new arrangement the person whose car is taken over by the army for use in the conflict can claim cash or treasury bonds bearing 5 per cent interest.

See America First — See America Now



EDITOR'S NOTE—This is the tenth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

No. 10—FREE MOTOR CAMPING GROUND IN COLORADO CITY, COLORADO

One of the noticeable things in the "See America First" movement is the conspicuous part the motor car is playing. Several camping grounds for motor parties have been established in the Pike's Peak region and maintained free of charge to motor touring parties. This is a typical scene at the camping grounds in Colorado City established by the Colorado City Commercial Club and the Colorado Springs Chamber of Commerce. All during the summer months many parties made use of these grounds as headquarters from which they took many trips in the Pike's Peak region.

Accessory Field Changes With Industry's Advance

Many Sundries and Parts Formerly Sold to Owner Direct Now Stock Equipment with Car Makers—Trend for 1915 Shows Electric Equipment Improved—Clocks Grow in Popularity—Considerable Alteration in Power Tire Pumps—Progress in the Carbureter Field—Development of Signals and Horns

THERE is probably no part of the motor car industry in which greater changes are to be seen than that of the various fitments and extra parts generally classed under the head of accessories. A continual variation and interchange among the makers and their products takes place, one kind of fitment rising on a wave of publicity and popularity for a short time only to fall and be submerged by the rise of another, like the waves on a restless sea.

Chiefly responsible for this is the ceaseless adding of equipment by the car makers. No sooner does a particular accessory become one considered generally useful than one or many car builders adopt it as a feature of the car. The article thus ceases to be an accessory, in the proper sense of the word, and becomes stock equipment. The maker of such an article then, instead of appealing directly to the motor car user for his sales, finds he is manufacturing a car maker's part and must look to the motor car purchasing agent, a less numerous but none the less lucrative field.

New Features of Equipment

This rule is illustrated better in its exception than in the observance. Three years ago electric lighting and starting systems were one of the major accessories with which manufacturers appealed to the owner. Today, the electric lighting and starting systems no longer are accessories—they are feature of equipment. Only one car of wide popularity does not make electric lighting and starting stock equipment. Consequently, nearly every manufacturer advertises Ford starting and lighting systems.

Ford is peculiarly favored in the accessory field, special tires, carbureters, magnetos, shock absorbers, horns, tire pumps, speedometers, spark plugs and a dozen other fitments are designed particularly for the Ford owner. The accessory market every year narrows more and more to this one field.

Of the industry as a whole, more accessory makers are in the field than ever before and all seem to have prospered, even in the face of the late financial stringency. This year, as last, electric equipment in general seems to have engaged the attention of accessory makers to a greater extent than all the other classes put together.

Electrical Equipment Improved

Ignition has been made a sister of starting and lighting, the tendency being to unite all the electrical apparatus of a car, either actually or in name. Not only has there been evidence of increase in the number of electrical systems in which the three functions of ignition, starting and lighting are cared for by the same outfit, but manufacturers of ignition apparatus have taken unto themselves the production or marketing of starting and lighting equipment. Within the past year the Bosch Magneto Co. has absorbed the Rushmore interests, Splitdorf is marketing the output of the Apple Electric Co., the Simms Magneto Co. is making the Simms-Huff starting and lighting system, the Remy Electric Co. is the pioneer in starting systems among the magneto makers in this country.

Battery ignition systems have increased in number and in refinement. Further application of the automatic spark advance feature is evidenced in the new systems and at the same time much has been done toward automatically increased heat of the spark as the need arises.

Greater accessibility and simplicity is evidenced in the starting and lighting systems themselves, several of the makers who hitherto have been devoted to separate-unit systems have come out with single-unit systems or two-unit systems. The outfits are lighter and more compact and better regulation is provided.

Magneto Protection

Waterproofing and dustproofing are the chief movements among the magnetos for this year. Though protection from road dirt and water has been the feature of a number of the magnetos for several seasons, it has been extended somewhat in the new models. A hotter spark at low speed is the worthy object of a number of the magneto makers and nearly all have made some step in this direction.

Spark plugs have seen considerable development in the past 12 months. The effort mostly has been in three distinct directions: less sooting, fewer parts, and handier terminals. In the reduction of sooting, this has been accomplished by keeping the oil away from the sparking points through special design of the porcelain or by leading the oil away by an elbow in the terminals, so that the oil collects at the lowest point, the elbow, instead of at the sparking points. By using fewer parts, fewer gaskets and fitting and cementing these parts together permanently, chances for loss of compression through or around the plugs have been minimized. There has been an effort also toward terminals which offer an easy yet permanent attachment for the high-tension wires.

In storage batteries, the trend of previous years toward very thin plates with their accompanying low weights, seems to have come to a halt, and even to be backing up on itself, if anything. It is being found that the better plan is a medium thick plate which has strength and material enough to withstand considerable undercharging and overdischarging even at the expense of slightly added weight.

Clocks Becoming Popular

Clocks for motor cars are attracting more attention and most of the concerns are producing 8-day clocks and there are one or two specially designed for truck use. The newest accessory along this line is the 1-year self-winding clock recently produced by the Stewart-Warner Speedometer Corp. This is operated with a dry cell and requires no attention except for a yearly renewal of the battery. Special devices for holding watches on the steering wheel also are supplied by other concerns.

Special features in the tire field comprise a rather decided increase in the number of red tubes. Another trend is shown towards re-inforced tubes of many kinds. Many tubes which have been re-inforced with fabric are making their reappearance, some surrounded wholely with fabric, others only on the tread, and still others at the back to guard against pinching. Non-skid designs of casings are not quite so freakish as they have been in former years and there seems to be a better distribution of rubber over the surface. Prices for non-skid treads are more reasonable, there not being as great a difference between the cost of non-skids and that of plain treads as formerly was the case.

In the Tire World

Tire fillers have almost disappeared, there being only two producers of fillers really active at this time. There are two or three puncture-sealing compounds, some of which seem to be received favorably. One tire concern formerly specializing in a cushion type of airless tire is featuring this year a pneumatic. One novelty is a puncture-proof pneumatic tire within which is incorporated a number of steel pumps, which are designed automatically to adjust the pressure within the tire to the load upon it. Another concern which formerly marketed and manufactured puncture-proof covers now is manufacturing tires in which this puncture-proof feature is incorporated.

Special tools are featured by a number of devices intended to render easier the demounting and remounting of tires on

transversely split demountable rims. These consist of a turn-buckle or toggle-joint arrangements by which the rim is contracted and expanded. For Ford tires, or other tires with clincher rims, there have been devised a number of what might be called tire plows as designed to provide quick removal of the tires and quick replacement simply by inserting the tool and revolving the wheel.

Vulcanizers have not undergone any radical changes, although there have been a number of new models gotten out by new firms. One feature which is taking prominence is the steam and direct heat types of vulcanizers in which the burner is arranged so there is no exposed flame, thus making for safety and preventing the flame from being blown out in the wind.

Power tire pumps have undergone considerable alteration, the trend being mostly toward the less expensive type designed to be marketed at a low price. Many of them are much more compact and lighter than previously and designed to be attached with less labor. The spark plug types of pumps are more in evidence and one concern, the Mayo, has brought out a permanently attached impulse pump, though it is not a spark plug pump. Instead of replacing the spark plug with the pump, the latter is horizontal and is screwed permanently into the cylinder plug, which ordinarily carries a priming cup. Consequently it is necessary only to turn a small cock when air is desired for tire inflation, instead of having to remove the spark plug and insert the pump.

Trend in Shock Absorbers

In the shock absorber field, the most important movement has been the multiplicity of special Ford types. There are more of these now than there are of the general types. Most of the Ford types and many of the general types are of the barrel form, in which one or two coil springs are employed. Older manufacturers have improved their equipment so that the casing is more nearly proof against dirt and water, and the spring design and material show that effort has been made towards making them stand up better on hard road surfaces. On the whole, prices are somewhat lower than they were a year ago.

In manufacturing the Ford types care has been taken to prevent interference with the fender irons and in many cases this is done by telescoping the top of the device over the remainder.

Great progress has been made by carbureter manufacturers during the year in the production of new types which show increased economy, flexibility and speed and allow of easier starting. Two prominent makers have brought out new dashpot types, which give somewhat better starting mixture and better pick-up and acceleration than did the former ones. Hot-air attachments are in almost universal use with carbureters and combinations of water-jacketed and hot-air models are on the increase. A number of new makers have appeared during the past 12 months, some with kerosene instruments, although the kerosene contingent is not as numerous as it was a year or so ago.

Improvement in carburetion has been made a subject of study by a number of accessory makers aside from the carbureter manufacturers. This is particularly true with regards to provision for making cold-weather starting easier and probably is due on the one hand to lower vaporizing points of fuels commonly used now as compared with those of several years ago and, on the other, to the universal electrification of the car, which provides a ready means for increasing the temperature, thus assisting vaporization and decreasing condensation.

In a few cases the makers have brought out single-jet types which show results obtained from double-nozzle instruments.

Electrical Heating Devices

There has been a greatly augmented number of electrical heating devices designed to be attached to or incorporated with either the carbureter itself or the manifold. This is accomplished by inserting a heating element either in the float chamber, the gasoline line or in or around the manifold and connecting it with the electric system of the car, so that upon starting the carburating system, the fuel itself can be warmed up electrically. The latest of the devices of this nature is a small heating element having much the appearance of a spark plug and which is designed to screw into the base of the float chamber instead of the drain cock. When current is applied to it, it heats up the gasoline in the float chamber to the vaporization point.

Speedometers have undergone very little change in design as the manufacture seems to have reached a firm basis of design. New models have been added to previous lines and new combinations with clocks and other instruments have been developed. There has been a largely increased number of models of low-price specially designed for installation on the Ford. Nearly every speedometer concern lists a special model for this car in the neighborhood of $15. Two concerns have developed new driving means, one being vanadium shaft and another being a new form of gear reduction at the wheel.

Motor car signals and horns, in particular, have undergone quite a downward revision in the matter of price and a corresponding reduction in complexity and weight. Hand-operated horns of the mechanical type have attained a sudden and wide popularity with the manufacturer and practically every concern building electrical signals has added one or more types of hand-operated horns to its line and a number of other concerns heretofore strangers to the signal field have followed suit.

One of the latest and simplest means is the Boyce hand horn, which instead of being operated by a downward push on a button is sounded by giving a twist to a milled head. The chief feature of this arrangement is that there is not the tendency to work the horn loose from its fastening that is present with some of the other types. A unique signal is a combination of fan and horn adapted in particular for the Ford. This is of the mechanical type and is operated by a cable from the dash. The fan blades are attached to a rotary portion of the horn casing and the signal is sounded by the rotating fan hub striking on a stationary diaphragm in the center.

Another unusual type of signal is a combination of electric bell and signal lamp. This can be mounted on the hood or radiator cap and is arranged so that pressure of a button not only rings a bell, but at the same time shows colored lights. Signals designed for indicating to other vehicles what the next move of a car is to be have been developed to a greater extent than previously. There are a number of these which show by illuminated signs whether the car so fitted is to turn to right or left or stop, etc.

Chief among the developments in the lighting field, aside from a great number of special Ford lighting systems is the development in headlight glare removers. Municipal restrictions upon glaring and dazzling headlights which have been incorporated in the city ordinances during the past year have resulted in the appearance of a large number of arrangements for providing good driving light without the dazzling effect.

Inter-Leaf Lubrication

In the field of spring miscellany, aside from shock absorbers, the chief movement seems to be a greater recognition of the need of inter-leaf lubrication, if the maximum in freedom from squeaks, easy riding and freedom from spring breakage is to be obtained. Most elaborately thought out of these arrangements are the methods by which a constant supply of lubricant between the leaves is assured by inserting between each two leaves strips of metal honeycomb filled with a lubricant. These provide permanent lubrication between the leaves and require no further attention after installation, the lubricant serving its purpose for years perhaps.

Another arrangement having a similar purpose is provided by forming the spring leaves themselves in such a way that pockets are formed in the leaves at intervals along their length and these pockets contain a supply of grease which works out between the leaves. To make easier the frequent application of oil to the springs as needed, there are at least two simple attachments to the springs which can be bolted on to them in a few minutes and serve as reservoirs for oil. A study of the points at which springs usually break, has led to one design in which a special strengthening means is provided at that point.

Feeding the Gasoline by the New Stewart Vacuum System

Explanation of the Device Which Changes Pressure to Gravity

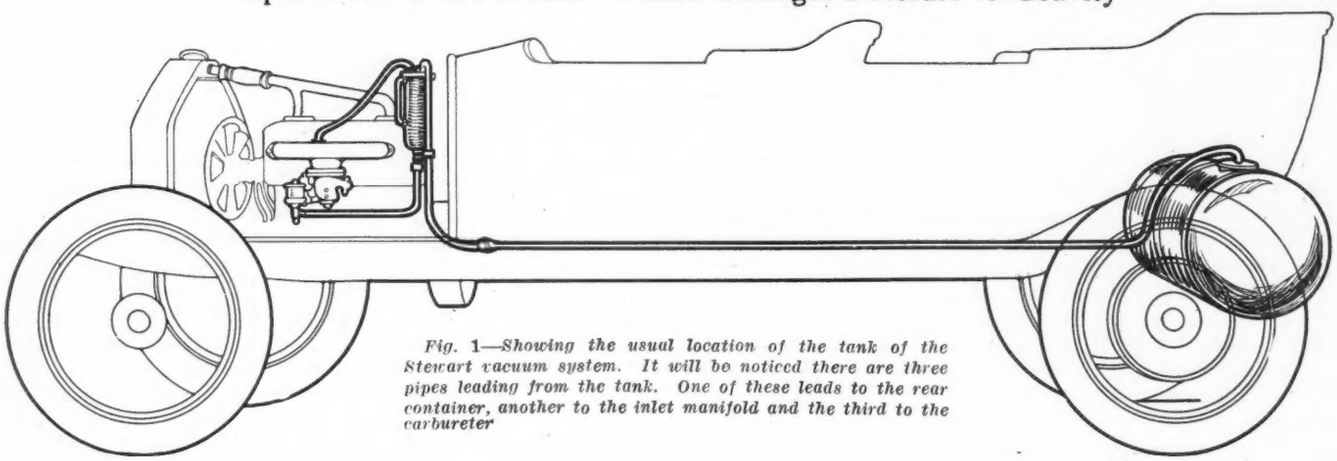


Fig. 1—Showing the usual location of the tank of the Stewart vacuum system. It will be noticed there are three pipes leading from the tank. One of these leads to the rear container, another to the inlet manifold and the third to the carbureter

THIS season marks the introduction of a new method of fuel feed, called the Stewart vacuum feed, which changes a pressure system into a gravity feed. While the idea of a combination pressure and natural feed is not new, its application as in the Stewart is without precedent. Three methods of fuel feed commonly have been used up to this time, the gravity, pressure and pressure-gravity. In the former, the tank is placed higher than the carbureter, usually under the front seat or in the cowl, and the fuel feeds by gravity to the carbureter, as shown in Fig. 4.

In the pressure system, the tank is placed lower than the carbureter and its usual place is in the wear of the chassis, as shown in Fig. 5 on the next page. The pressure for forcing the fuel from the tank to the carbureter is obtained by either a hand pump on the dash, a motor-driven pump, or both. In the pressure-gravity feed a tank is used at the rear and another in the cowl. The fuel is pumped by pressure from the rear tank to the cowl tank and then fed to the carbureter by gravity.

In the Stewart vacuum-feed system, the tank at the rear of the chassis remains in position, the cowl tank is done away with, but a small tank containing a float mechanism is placed on the dash. This small tank, by means of motor suction, draws the fuel from the rear tank and then feeds it to the carbureter by gravity, making air pumps or air lines of any description unnecessary.

Units of the System

The system comprises a cylindrical tank about 9 inches deep and 3 inches in diameter mounted on the motor side of the dash or any other convenient place. This tank is divided, by a suitable partition, into two compartments, an upper and lower chamber. The upper is connected to the intake manifold by one pipe and to the gasoline tank at the rear of the chassis by another. The lower compartment is connected to the carbureter in the regular way.

Within the upper compartment is a float

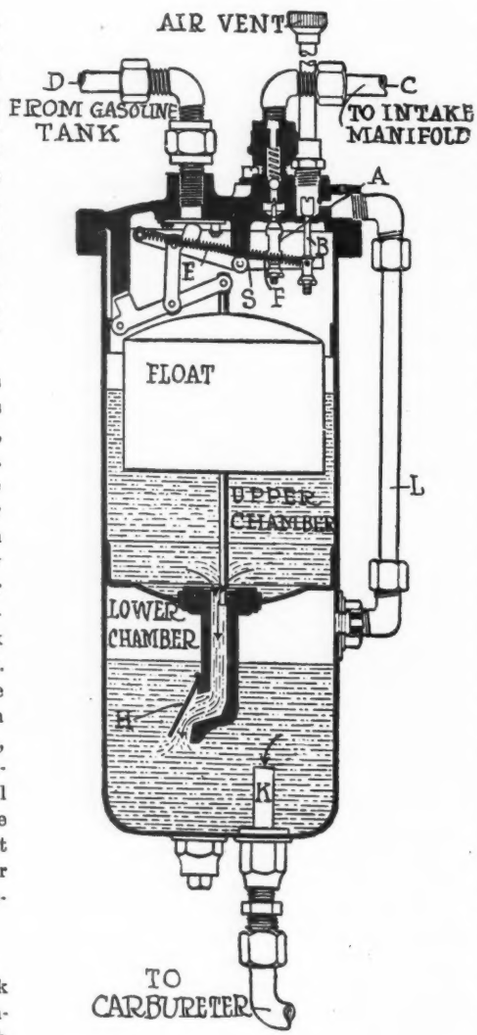


Fig. 2—This shows a sectional view of the Stewart vacuum tank. Engine suction produces a vacuum in the upper chamber, which causes fuel from the rear tank to flow through the pipe D to the upper chamber. As soon as the float rises to the top the vacuum valve A closes and the atmospheric valve B opens. This allows atmospheric pressure to act in both chambers and the flap valve H opens, the fuel drops to the lower chamber and then feeds to the carbureter by gravity

which controls two valves. The operation of the engine causes a vacuum to be formed in the upper compartment and this causes fuel from the supply tank to rush to the upper chamber. As soon as the float has risen high enough, one of the valves mentioned closes the connection between the compartment and the intake manifold, thus stopping the vacuum action. At the same time, a valve is opened which allows the atmospheric pressure to act on the gasoline which entered the chamber. The atmospheric pressure forces the fuel from the upper to the lower chamber through a common flap valve and from the lower chamber feed is by gravity.

Operation in Detail

In the illustration in Fig. 2 is shown a sectional view of the vacuum tank. At D is attached the fuel pipe which runs to the rear gasoline tank, as shown in Fig. 1. At C is fastened a pipe which attaches to the intake manifold and at K is the connection to the carbureter. The upper and lower compartments of the tank are divided and communication between them is by means of the flap valve H. This is nothing but a hinged plate covering and uncovering a port automatically.

Since the fuel from the lower chamber feeds by gravity, atmospheric pressure must be present in this chamber at all times and to get this condition, the chamber is made to communicate with the outside air by means of the pipe connection L, to an air vent. The upper chamber contains a float, which by linkage E and F and the springs S opens and closes the valves A and B.

Let us suppose the engine to be running. Because the upper chamber communicates with the intake manifold, the suction strokes of the motor will cause a vacuum to be created in the upper chamber and when this is so, the fuel from the rear tank fills the vacuum. When fuel enters the upper chamber, the float rises and when it reaches a fixed point, the vacuum valve A is closed just as the float valve of

a carbureter is closed when the float reaches a certain point. The linkage is such that the closing of the vacuum valve causes the atmospheric valve B to open. This is true because the lever E, more clearly shown in Fig. 3, is pivoted at P, and the vacuum valve has its seat on the opposite side of the atmospheric valve. It is evident when the lever moves downward, valve B will close and valve A open. As soon as B opens, the atmospheric pressure, about 15 pounds per square inch, acts upon the fuel in the upper chamber. This pressure forces the fuel through the opening previously sealed by the flap valve and into the lower compartment. Here the fuel is under atmospheric pressure all the time, and this compartment, directly connected to the carbureter in the regular way, feeds its fuel by gravity. Then, as soon as the upper chamber is low in fuel, causing the float to drop, the suction valve again opens, creating a vacuum which immediately is filled and the process previously described is repeated.

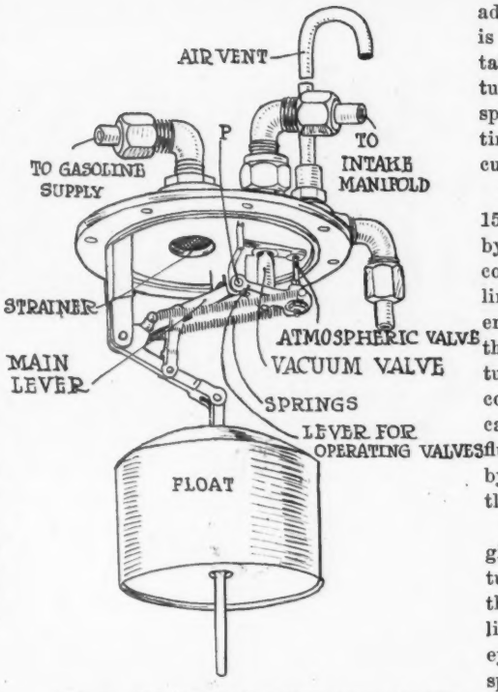


Fig. 3—Details of the linkage from the float to the vacuum and atmospheric valves. The former has its seat facing upward and the latter downward, so that when one valve closes the other must open. This illustration is shown to make the working mechanism clear

For the Garage and the Car

PYRENE—Pyrene is a fire extinguisher which can be carried on the car itself and also is intended for installation in garages. Pyrene liquid is a chemical combination of purely organic materials, having an aromatic odor and a high specific gravity. As it touches the fire or even the heated part of the motor the liquid is converted into a dense white gas blanket which surrounds the fire and smothers it. It is non-damaging and non-corrosive, it is claimed; it does not freeze at 50 degrees below zero and does not evaporate. Fire insurance companies grant a 15 per cent reduction in premiums on cars equipped with Pyrene. The extinguisher is 14 inches in length, 3 inches in diameter and weighs 6 pounds. In brass it sells for $7 and nickel plated at $8. The Pyrene Co. of New York is the manufacturer.

Allen Radiator Cover—Protection for the radiator in winter is the purpose of the Allen radiator cover, manufactured by the Allen Auto Specialty Co., New York. This cover, made to order of fabric leather, lined with first quality robe plush, is quickly adjustable for varying temperatures and is easily attached to the radiator. It retails for $6. The company also manufactures the Allen tire case, a protector for spare shoes; and the Allen Tyrometer, a tire-pressure gauge for which absolute accuracy is claimed.

Bailey Exhaust Heater—Weighing only 15 pounds and capable of being installed by the owner himself, the Bailey heater consists of a valve placed in the exhaust line between engine and muffler or at the end of the muffler pipe. From this valve the heated gas passes through flexible tubing to the heater proper. This last comprises a muffler, a seamless tube located in a metal box. The radiator lies flush with the floor. The device is made by the Bailey Auto Heater Co., New Castle, Pa., and sells for $20.

Dinshah Engine Tester—The Dinshah engine tester consists of as many vacuum-tube-spark-gaps as there are cylinders in the engine, located within a closed camera-like box with a padded face-mask for the eyes. Four connectors extend from the spark-plug cables and to a convenient ground on the engine. When connected up the engine is turned over and the sparks in the gaps indicate whether the ignition is perfect or faulty. It is made by the American Taximeter Co., New York, and sells for $20.

Weaver Auto Ambulance—The Weaver Mfg. Co., located in Springfield, Ill., has in its auto ambulance a device that is of use in towing in crippled cars. It can be attached to either axle of the car, handled by one man and has a telescoping tongue. The wheels are about 15 inches in diameter, with 3-inch tires that permit of the device being used on country roads. Its shipping weight is 145 pounds and its list price $30. The company also has twin jacks which serve as a turntable, lifting jack, tire rests and a transporting truck. The list is $12 for a single pack and $20 for two. The latter gives one for each axle of the car.

Standard Garage—The Ashley Steel Building Co., 1790 Broadway, New York City, makes steel garages of various sizes listing from $134 up to $296. Each garage is knocked down ready for assembly by the purchaser.

Cars With the Vacuum Fuel Feed on One or More Models

Allen	Marmon
Auburn	McFarlan
Austin	Mitchell
Buick	Moon
Cole	Norwalk
Crawford	Oldsmobile
Dorris	Oakland
Haynes	Overland
Imperial	Paterson
Jackson	Peerless
Jeffery	Pilot
Kisselkar	Republic
Kline	Speedwell
Krit	Velie
Lexington	White
Lewis	Westcott

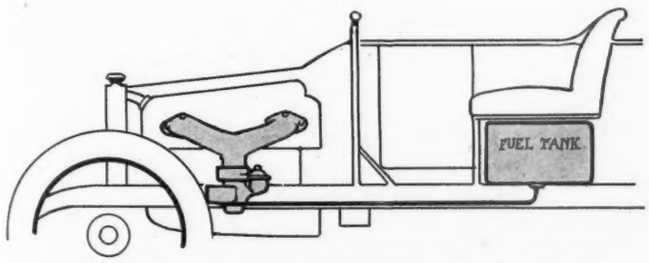


Fig. 4—This shows the conventional gravity feed in which the main tank is placed under the front seat and the feed to the carbureter is a natural one. In some designs the tank is placed in the cowl. In all these designs the tank must be higher than the carbureter so that proper head is obtained. The feed from tank to carbureter in the Stewart system is exactly like the gravity

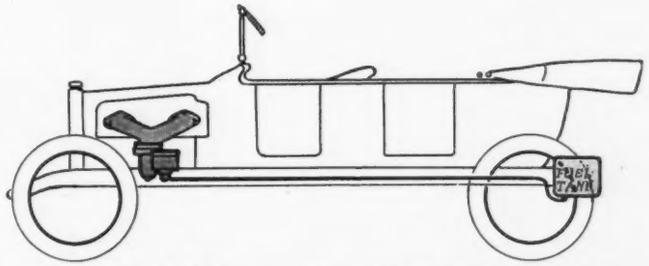


Fig. 5—The straight pressure feed, which has the tank at the rear of the chassis. The fuel is forced to the carbureter by air pressure usually obtained from a motor-driven or hand pump. There are types of feed which are combinations of the pressure and gravity and operate like the vacuum feed with the exception the fuel is brought from the rear tank to the auxiliary by air pressure instead of by vacuum

Carbureters and Carburetion Sundries

CARBURETER manufacturers have made great progress during the year in the production of new types, which show better economy, flexibility and speed than the older ones, and allow of easier starting. The problem of starting has become very important, and carbureter makers have done much toward getting a rich initial mixture into the cylinders, so that excessive cranking will not be necessary. The 1915 carbureter is more flexible than those of a year ago; it assists in giving greater speed and better acceleration.

New makers have come in, some with kerosene types and others with unusual forms of gasoline carbureters. The kerosene representation is not as great as it was formerly. In some of the new carbureters a return is made to the single jet, the latest of these being types which are said to give the results of double-jet carbureters.

Two of the prominent makers, Stromberg and Rayfield, have brought out dashpot instruments which are improvements over the former types in that they give a better initial mixture, prevent auxiliary air valve fluttering and are more economical.

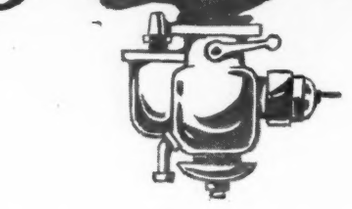
Carbureters fitted with hot air attachments are almost in universal use and the field tends slightly toward the combination waterjacketed and hot-air types.

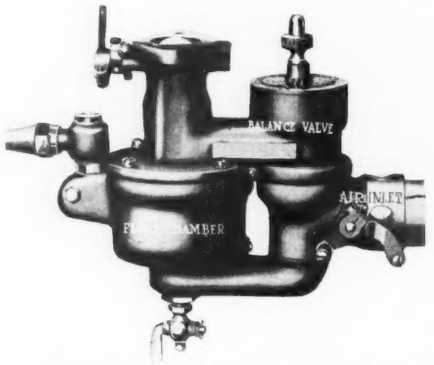
Rayfield—A dashpot type of carbureter called model G when waterjacketed, and L when not, is claiming most of the attention of the Findeisen & Kropf Co., Chicago, maker of Rayfield carbureters. This new carbureter in general resembles the model C, the adjustments and fundamental principles of operation being alike.

The new carbureter has what is called a dashpot, shown in the illustration herewith. Within this dashpot is a piston S, which operates two air valves, one lettered V and the other L. The piston is used to prevent the air valve from fluttering and offers resistance to the valve when the throttle is opened suddenly. This causes increased suction at the nozzles and consequently better pickup is obtained.

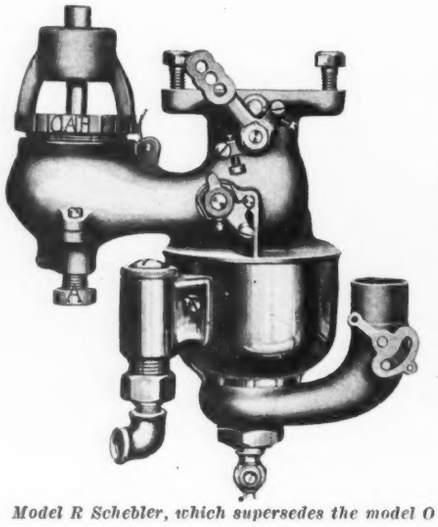
The Rayfield model G has three air intakes, as in the previous model, two of these being automatically operated by the piston in the dashpot and the third is a fixed opening. The upper air valve V operates what is called a metering pin, P which causes to be supplied an increased amount of gasoline in proportion to the air admitted.

It will be noticed the dashpot chamber communicates, by means of a horizontal passage, with the float chamber, which means that the chamber underneath the piston always contains gasoline. When the throttle is opened there is a tendency on the part of the air valve to open quickly and too much, thus causing fluttering and a poor mixture. The piston, however, acting against the gasoline, eliminates this excessive opening and at the same time enriches the mixture. This feature is especially valuable in starting, when a rich mixture is desired, and also in quick throttle opening, for rapid acceleration.





Stromberg latest model, the single-jet type K



Model R Schebler, which supersedes the model O

Stromberg — The Stromberg Motor Devices Co., Chicago, is offering for 1915 a line which includes two new types which show departures from former practice of the company. These new instruments are called the H and K, the former being a dashpot type, with two nozzles, and the latter the newest Stromberg creation, a single-nozzle affair with one air inlet.

Model K is an unwaterjacketed type and is unique in construction in that it uses what is called a balanced valve, shown in the sectional diagram herewith. In action, this valve diverts a portion of the air taken through the single inlet and this air current passes to the upper end of the venturi tube which surrounds the single fuel nozzle. This diverted air exerts additional suction on the nozzle so that, while there is one nozzle and one air inlet, there is a compound action on the nozzle, giving the features of a double-jet carbureter.

As shown herewith, there is a small passage P, which connects the chamber B above the valve with C below it. The chamber A above the piston always contains air under atmospheric pressure, except when the dash control valve or air intake shutter is used, because of its communication with the chamber D through the space around the spring and up through the valve sleeve. The vacuum in B is substantially the same as that in C. The air valve tends to move upward by difference in pressure between C and D, while the piston tends to move downward by the difference in pressure between A and B. As the piston is approximately twice the area of the valve, the whole valve opens downward but the balance between the chambers is such that the pulsations of motor suction are deadened and the valve flutter thus eliminated.

The other Stromberg is the model H, unwaterjacketed, and HA when jacketed. This is a dashpot type with a novel method of controlling the auxiliary air.

Schebler—Schebler carbureters, made by Wheeler & Schebler, Indianapolis, Ind., will be marketed for 1915 in practically the same styles and form as in the year just ended, the models R and L being the leaders.

The model R, which was brought out during 1914, supercedes the model O. The new type is a single-jet instrument using two air inlets, one fixed and the other automatic. The automatic valve controls the lift of the single needle valve and in this way any extra air taken in will cause additional gasoline supply to be carried in also. In this way, as motor speed increases and the air valve opens, more fuel is added to keep the mixture constant.

The new model R is shown herewith with the adjustment points marked. The auxiliary air valve is adjusted by means of the cap shown. The correct position of this valve is determined by first turning the valve to right as far as it will go and then turning it back one turn. If this position causes poor firing the cap should be turned either clockwise or anti-clockwise until the motor fires on all cylinders. The screw A is turned upward, should the motor misfire when quickly accelerated.

This instrument is furnished with dash or post control and in jacketed or unjacketed types. Four sizes are made, 1, 1¼, 1½ and 1¾ inch.

The Schebler model L is operated on the same principle as the R, using a needle valve controlled by the auxiliary air valve. Gasoline is controlled for either low, high or intermediate speeds in this type.

The illustration herewith shows the adjusting points, B being the needle valve, and D and E the intermediate and high-speed adjusting dials.

The Schebler company also is marketing special Ford carbureters, including manifolds and hot-air attachments, and special types for such cars as Overland, Studebaker, Stearns and Hupmobile.

Zenith—In addition to its two standard models, the Zenith Carbureter Co., Detroit, has added a new type for 1915 designated as Model O, which has been built more particularly for the small car trade and sold at a lower price than the other models, though retaining the standard Zenith features.

The Zenith principle is a compound, compensating-nozzle arrangement, which is claimed to give a constant ratio of air to gasoline at all motor speeds. The main fuel jet, which is fed directly from the float chamber, is surrounded by the auxiliary jet giving rise to the compound construction. The outer jet connects through a small tube to an orifice in communication with the float chamber. The supply of fuel in this tube is constant, so far as the level in the float chamber is constant, for it depends upon that level for its own height. Thus, the supply of fuel given to the outer jet does not increase or diminish with the variation in the suction due to the air passing through the venturi tube.

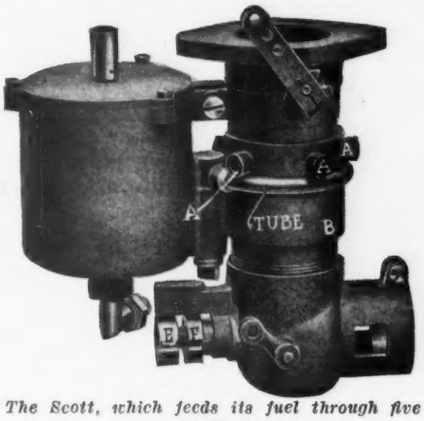
The main jet action is similar to that of any carbureter having one jet, the amount flowing through it being in proportion to the throttle opening. The main jet is furnished in different sizes.

Naturally, the greater the throttle opening the greater the tendency is to lower the fuel level in the supply chamber with consequent decreasing of the amount of gasoline passing through the outer jet. At the same time the main inner jet acts in the opposite way and thus the combination serves to compensate for all speeds and give a constant ratio of fuel to air due to the two jets acting in diametrically opposite directions.

In the Zenith carbureter design, there is really a third auxiliary jet which comes into action only for starting or for slow running.

Holley—The Holley, made by Holley Bros., Detroit, Mich., is of the concentric float type with the fuel nozzle in the center of the most constricted portion of the venturi.

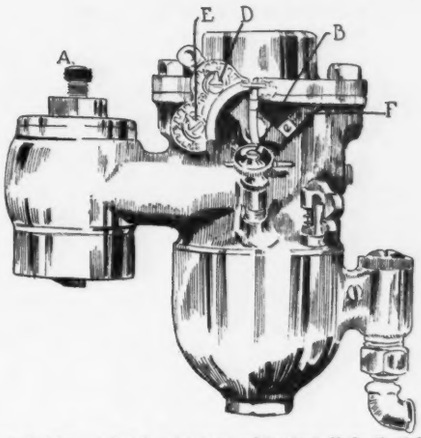
Referring to the sectional view herewith, the fuel passes from the chamber D into the nozzle well I, through a passage drilled through the separating wall.



The Scott, which feeds its fuel through five nozzles A

Holes in the walls of the fuel nozzle, tube H, allow the gasoline to pass into the nozzle proper and to flow past the needle valve F to a level in the cup-shaped upper end, which just submerges the lower end of the tube J, which has its outlet at the throttle disk.

With the throttle almost closed, which is its normal position at starting, the gasoline is sucked up through the tube J and a throttling plug K into the passage to the motor. This sends a rich mixture, which has the effect of priming. After the motor is running beyond idling speed, the suction passed the main nozzle M draws the fuel up through it. This is atomized and mixed with the inrushing air in the usual way. This action exhausts the supply in the well at the bottom of the nozzle, tube H, and the spraying of gazoline through the tube J automatically ceases, the motor getting its proper mixture through the main jet. Before the fuel reaches the float chamber it passes through a strainer disk, shown in the illustration.

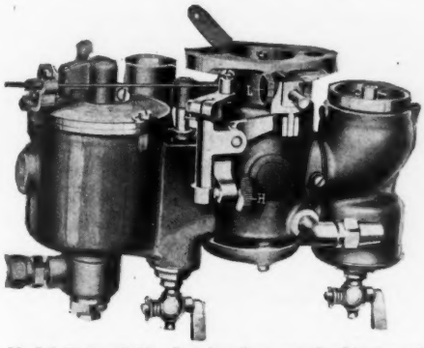


Schebler model L, showing adjusting dials E and D and needle valve B

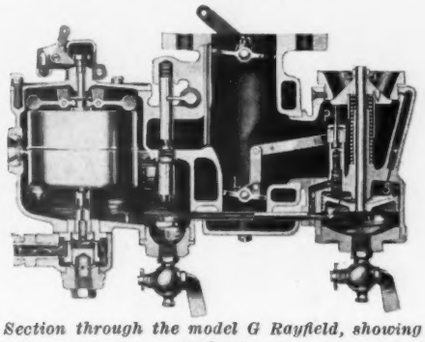
There is but one adjustment in the Holley carbureter, that being of the needle valve F.

A special Holley design for Ford cars is identical with the standard model in design and operation, the chief difference being in the construction for giving a horizontal instead of a vertical outlet to the engine, and a needle valve controlled from above instead of below the main body of the carbureter.

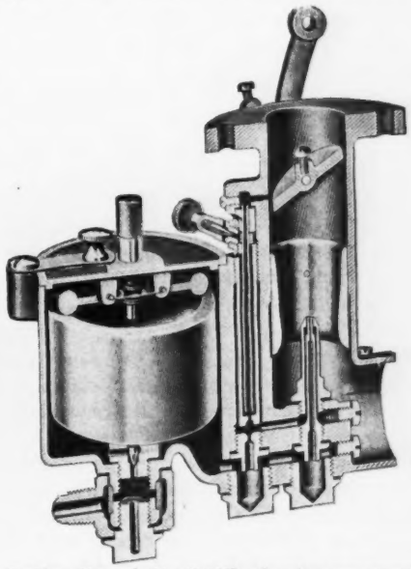
Master—The Master carbureter, which is made by the Master Carbureter Corp., Detroit, remains the same in design as heretofore, and it is of the eccentric float type with a rotary throttle and horizontal



Model G Rayfield, showing low-speed adjustment L and high-speed H



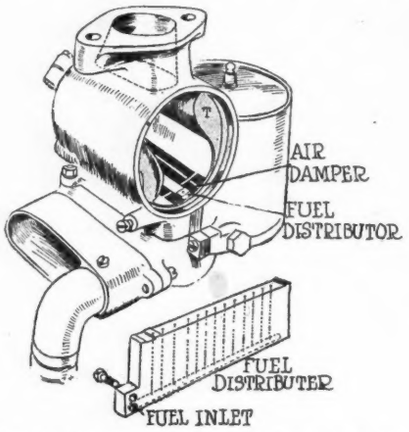
Section through the model G Rayfield, showing dashpot



Section through the Zenith, showing compensating nozzle arrangement

fuel distributer extending across the air passage as the distinguishing features.

Referring to the sectional view of the instrument, the fuel distributer extending across the air passage is shown at C. This has a number of small holes drilled along its length, and the lower opening H in the rotary throttle D is so shaped as to uncover more and more of these holes as the throttle is opened. At the same time,



View of Master carbureter, showing fuel distributer and damper

due to a similar opening H in the upper surface of D, an increasing amount of gas is admitted through the intake O. Thus the fuel supply is mechanically apportioned in accordance with the throttle opening. The air enters through the intake A and mixes with the fuel issuing from the small holes, and passes on to the engine through the openings H and H.

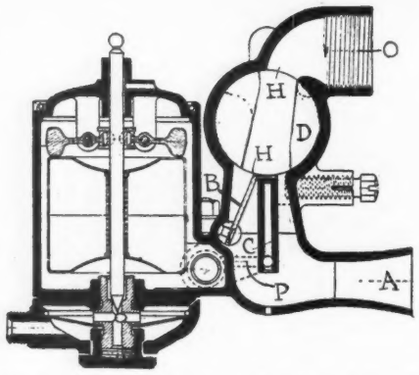
When the throttle is closed, there is still one distributer hole uncovered which admits sufficient fuel for slow speed or idling. To regulate the air supply and thus control the mixture, the air damper B is placed in the air passage. This is simply a flat piece of metal arranged to swing about its base, so as to shut off any part of the air. As shown, it is set for a rich mixture, whereas if partly open, the proportion of air would be greater.

Distributers of various capacities are available for fitting to the various sizes of carbureters. Wear is impossible, it is claimed, with the rotary throttle for it does not touch the throttle chamber in which it operates.

Master carbureters are made in sizes from 1 inch to 2½ inches, these ranging in price from $20 to $60. There is also a 1-inch Ford size which fits to the engine in place of the regular carbureter. This sells at $20.

Kingston—No changes have been made in the line of carbureter manufactured by the Bryne, Kingston Co., Kokomo, Ind., the model Y and the inclosed pattern being continued without change. Both models have but one adjustment and this is a needle valve acting on the fuel nozzle. Extra air is supplied by the raising of ball valves against gravity.

In the inclosed pattern the air is taken



Master showing passage HH, through which fuel passes to the manifold

in at one side where part of it passes underneath where it enters a venturi tube, mixes with the fuel and rises to a point where the auxiliary air valve balls allow more air to enter. The mixture is then complete and passes to the motor. There is a strangling valve to make starting easy.

The principle in the model Y is the same but the mixing chamber is horizontal.

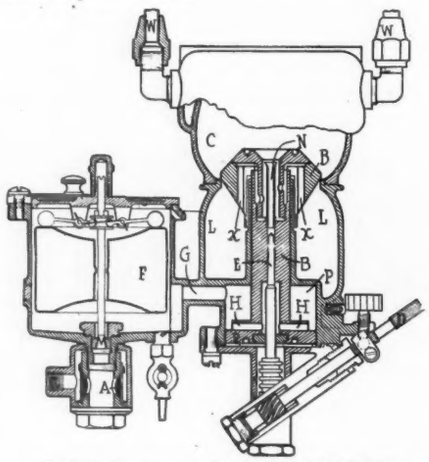
Breeze—Two models, the S. L. and H, are made by the Breeze Carbureter Co., Newark, N. J. A few changes have been made making them simpler and less delicate but in main the carbureters resemble those of this year.

Both carbureters have adjustable needle valves and automatic adjustable auxiliary air valves. The main difference between the two carbureters is that the S. L. has a horizontal air valve opening and needle valve and the H has a vertical opening and needle valve, the former being offset.

The low-speed adjustment is by means of the needle valve and the high-speed by varying the tension on the air valve spring.

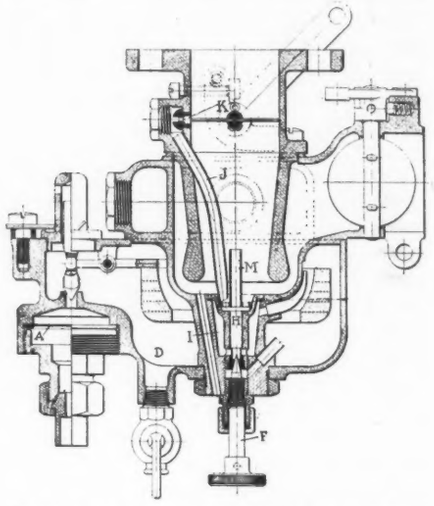
The carbureter has a hot air pipe attachment and a choker for easy starting.

Marvel—No changes of note have been made in the Marvel carbureter made by the Marvel Carbureter Co., Flint, Mich. It is a double-jet type with a manually controlled auxiliary hot air supply and a similarly controlled choker for easy starting. Two jets are used, the second jet being brought into action by the opening of the auxiliary air valve.



Sectional view of the Stewart Model 25

When the motor is idling the hinged auxiliary valve which shuts off part of the passage is closed thus rendering ineffective the jet in this part. At this time the air passes up through the small venturi surrounding the low-speed jet. As the suction of the motor increases the auxiliary valve is opened against a spring



Showing working parts of the Holley carbureter

pressure and the second jet comes into action.

A dash-controlled choke valve in the main air entrance allows a rich mixture to be obtained for starting.

A feature of the carbureter is an exhaust heat jacket, manually operated, which aids in the vaporization of the fuel.

Stewart—The Detroit Lubricator Co., Detroit, which took up the manufacture of the Stewart carbureter some 2 years ago, has a new design, model 25. This differs from those types which it supersedes only in some constructional details, the principle and operation being identical with that of all Stewarts. The operation depends upon a metering valve and taper pin, the two working in unison to automatically measure the amount of air and gasoline entering the mixing chamber.

The main change in the new model 25 over its predecessors is in the dash control D, shown in the sectional view herewith. This is placed at an angle instead of being horizontal, and has the advantage of easy installation, doing away with the need of universals or flexible couplings in order to operate it from the dash.

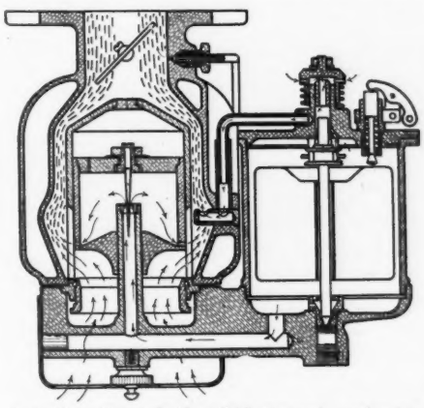
With the exception of the float mechanism, the Stewart carbureter has but one moving part, the metering valve, which may be taken apart and cleaned without disturbing the adjustment. Referring to the sectional view, the metering valve is seen at B. It goes down over the taper pin E, and when not operating seats on the bottom R of the dashpot P. It is in its idle position in the cut.

Gasoline flows from the float chamber through the connection G and the holes H in the lower part of the metering valve into the well around the taper pin E. When

the carbureter is at rest, a small amount of fuel collects in this well. When the engine starts, this is pulled up into the mixing chamber C, and gives a rich starting mixture. As the motor picks up, a partial vacuum or suction is created above the metering valve B in the chamber C. This causes B to lift from its seat and to permit air to pass from the chamber L into chamber C. Since pin E is tapered, the more B is raised, the greater the opening around E and the more fuel can flow. The height B is raised is, of course, dependent upon the suction, which in turn is in proportion to the engine speed. Therefore as the suction varies the height of the metering valve varies, and the volume of air and the amount of gasoline admitted to the mixing chamber increase or decrease in the same ratio.

Through most of the air passing through the carbureter goes through the air passage around the metering valve, a small amount passes through the holes X and past the end of the aspirating tube at N. The flared end is a small venturi, and increases the air velocity at this point. As the gasoline issues from this tube also, this greater air velocity splits the fuel up into finely-divided form.

Browne—The new type of single-nozzle carbureter called the Browne and made by the Holt-Wells Co., New York, has an auxiliary air valve in the form of an aluminum cup as shown in the sectional diagram herewith. Only one size is made for all motors, the only difference in construction for different engines being in a bushing above the air valve.



A section through the 1915 Necomb carbureter

The float arrangement is conventional and the nozzle feeds the fuel and the primary inlet the greater portion of the air, while the auxiliary valve, acted upon by both engine suction and air velocity past the nozzle, feeds additional air in proportion to speed and load, it is claimed.

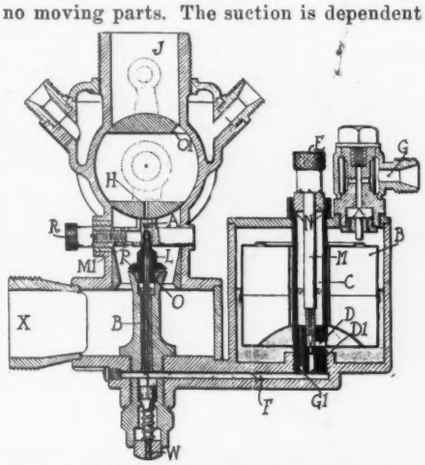
The auxiliary air valve is located in a chamber shown in the illustration and the latter communicates with the venturi tube by means of a passage within which is a ball check. Underneath the valve is a spring by means of which valve return is obtained. Above the valve is a bushing with a curved surface.

Vacuum tending to cause fuel flow also will act through the passage on the auxiliary air valve, thus opening it against spring tension. As the vacuum increases the valve goes downward, the opening at the top becomes greater and more air is allowed to flow between the bushing and the valve. Thus the vacuum in the small chamber underneath the valve determines the extent of valve openings, and since for a given vacuum there is a definite fuel flow for each rate of fuel flow there is a definite valve position.

Scott—Scott & Sons, Medford, Mass., who marketed three Scott carbureters in 1914 have discontinued the waterjacketed models. The 1915 instruments are the models A, N and H, the model N being illustrated herewith as being unique in construction. This carbureter gives a better diffusion of the mixture by using five fuel nozzles A in the illustration herewith, disposed around the mixing chamber. These nozzles are mechanically controlled by a sleeve B, which is attached to the throttle. This sleeve has five ports of varying lengths which register with the nozzles and bring them into play progressively so that with wide open throttle all the nozzles are in use and at low speeds only one. The gasoline is supplied to the nozzles through the tube shown in the illustration. The Scott uses two air valves mounted horizontally and both being automatic in action. These valves are adjusted by the screws E and F in the same way as conventional auxiliary air valves.

Maco—No new Maco carbureters are offered by the Gleason Peters Air Pump Co., Brooklyn, N. Y., the 1914 instruments, five in number, being continued unchanged. All are single-jet carbureters with the jet S directly in the center of the float chamber F, as shown in the illustration herewith. A venturi tube surrounds the jet, the main air inlet P being at the bottom. There is also an auxiliary air valve of conventional construction mounted above the nozzle.

Zephyr—The Zephyr carbureter, produced by George A. Breeze, Detroit, Mich., is a type of instrument in which there are no moving parts. The suction is dependent upon to draw the fuel through jets of predetermined size. The main features are the low and the high-speed jets.

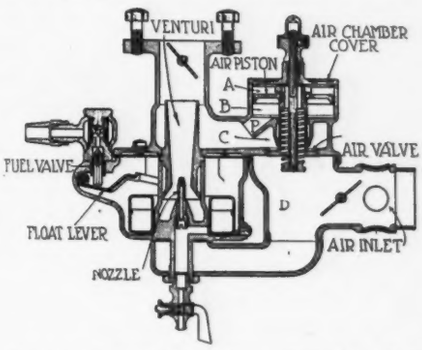


Sectional view of the Longuemare

In the sectional view, a form of Zephyr instrument with vertical venturi is shown. When the throttle valve T is open, air passes up through the main air intake E, and the greatest suction is created at the point where the venturi reaches its smallest diameter. This is where the main jet J is located. Thus the fuel is sucked up from the float chamber through the passage X and sprayed through the atomizer M into the current of air flowing in through jet tube J. This breaks up the fuel at the point of union and the whole mixes with the main current of air at the throat of the venturi tube, forming a proper mixture at this point, it is said.

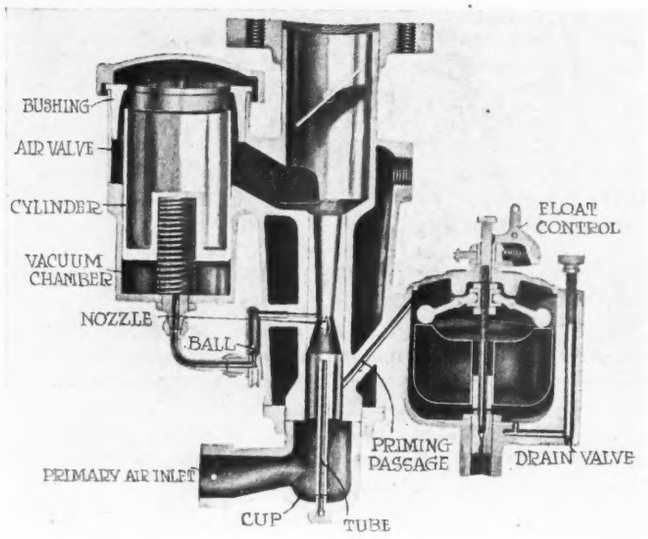
When throttle valve T is closed, the low speed jet J_1 comes into action. The majority of the atomized fuel formed at M in the main jet then is drawn up through the passage Y, through a hole in the main jet tube. This is sprayed through the slow speed jet directly into the carbureter tube on the motor side of the throttle valve. This sends a rich mixture to the motor which would otherwise get only a very lean mixture due to the small amount of air passing through the main passage and past the main nozzle through which only a small amount of fuel is issuing into the main passage.

Johnson—The Johnson is one of the newer designs of carbureters on the market. It is the product of the Johnson Co., Detroit, Mich., and is made in several forms with concentric float. The distinguishing feature of the Johnson is the sleeve which is lifted by the suction and thus admits air through openings between the bottom of the sleeve and its seat, the amount of air varying with the height the sleeve is raised. The air supply, and therefore the mixture, is controlled automatically by the suction, which in turn, is dependent upon the throttle opening.



The new model K Stromberg, which has a balanced valve and one nozzle

A section through a typical Johnson instrument of the adjustable nozzle type is shown herewith. The carbureter is seen to consist of two compartments, the lower the float chamber and the upper one the mixing chamber. The brass sleeve A slides up and down in the mixing tube M. At its



Browne carbureter, showing the cup-like auxiliary air valve at the left under which is the vacuum chamber which communicates with the venturi tube

lower end this sleeve carried a small lifter plate L which extends down into the strangle tube T and over the spray nozzle N.

In operation, warm air taken from around the exhaust pipe, enters the mixing chamber at W. It then divides, and some of it finds its way down under the strangle tube T through the passage P, and picks up gasoline from the nozzle. After passing the nozzle, this jet of air strikes the lifter plate L and raises sleeve A, allowing more air to pass into the mixing tube M above the spray nozzle. This second current of air goes through the concentric passage X and the opening made by the raising of the sleeve from its seat.

As the throttle is opened and the suction on the carbureter increases, the sleeve in the mixing tube rises higher, and allows more air to enter above the nozzle, thus automatically apportioning the parts of air and gasoline in the mixture. A choker is fitted which simply moves the strangle tube around so as to open or close the ports in the carbureter body which govern the amount of air passing the nozzle. This choker connects to a dash adjustment to give a rich starting mixture.

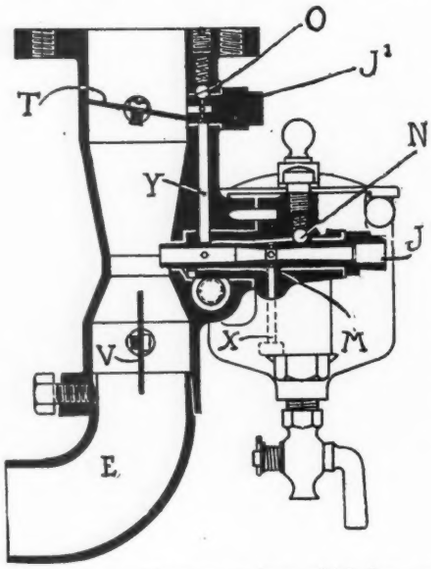
Hampton—Three distinct types of carbureters, all of which are new, are made by the Hampton Kerosene Carbureter Co., New York. One is a twelve-jet gasoline carbureter for which very rapid acceleration power is claimed, another is a combined kerosene and gasoline carbureter and the third is a simple gasoline carbureter for Fords, illustrated herewith.

The combination carbureter is equipped with a dual float chamber, one for gasoline and the other for kerosene. The motor is started on gasoline and after becoming slightly warmed, a valve on the dash is turned, the kerosene float mechanism begins feeding and the gasoline is shut off. To aid in vaporization of the kerosene the mixing chamber is jacketed so that the exhaust gas from the motor may pass around it and so heat the mixture.

The outstanding feature of this carbureter is the method used to heat the kerosene to insure its perfect vaporization. Instead of having a spray nozzle the fuel passes from the float chamber to a cone-shaped passage which is .003 to .004 inch in thickness. The outside wall of this passage is raised to a high temperature by the exhaust heat and as the fuel strikes this wall it is quickly vaporized due to the thinness of the film of fuel as well as the intensity of the heat.

The Ford carbureter is a simpler design for gasoline only and sells for $7.50 with a money-back guarantee. It is said that it will give more power, flexibility and economy. The Hampton-Ford is illustrated herewith.

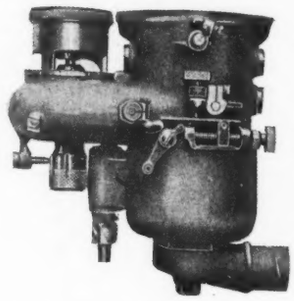
Air Friction—Model C Air Friction carbureter is retained with slight improvements and a new model D with a non-adjustable nozzle has been added. The latter is the same in principle as the former but the flow of fuel is regulated by the size of opening in a small bushing or jet in the interior of the nozzle instead of by a needle valve. This device is merely for controlling the amount of flow, the spraying of the fuel in either model is accomplished by allowing it to flow out through a very thin circular opening.



The Zephyr carbureter, a type which has no moving parts. J is the main fuel jet

The fuel in entering the carbureter is filtered through a fine gauge brass screen, whence it passes through the float chamber and enters the nozzle stem, where it passes by the adjusting needle in the old carbureter or the fixed nozzle in the new and from thence is distributed between four lateral openings to the two horizontal surfaces mentioned.

Surrounding this large circular spray nozzle is a metal air valve or sleeve, truncated at the bottom. This valve is housed in a brass liner and is free to move upward. When the motor is stopped this liner with the valve is in its adjusted position. As soon as the motor starts the suction of the motor raises this valve and thus increases the annular opening and the flow of air through it.



Single-jet vertical-type Webber carbureter

This carbureter is made by the Air Friction Carbureter Co., Dayton, O.

Greuter—The feature of the Greuter carbureter, which is made by the C. R. G. Mfg. Co., Long Island City, N. Y., is that it is really three carbureters in one, since there are three separate nozzles, each in its own venturi tube. At slow speeds only one nozzle operates, then as the throttle is opened, the second one comes into play and finally all three. When the throttle is nearly closed and the motor is idling or running under a small load, the cam attached to the throttle butterfly shaft holds down the two levers, which control the jet passages.

When the throttle is opened beyond a certain point, one of these levers is released and the valve raises according to the suction. Still further movement of the throttle in the same direction and the other lever is released and the valve it controls is lifted more or less depending on the suction of the motor.

At the bottom of each venturi tube there is what is known as a priming disk which is for the purpose of obtaining proper mixture when the venturi tubes are coming into action. Take, for example, the case of the medium speed venturi. Suppose it is just coming into action. The flow of air

past the nozzle is very slight and not sufficient to give a good mixture. The weight of this valve slightly resists the passing of the air thus forming a partial vacuum and assisting in the production of a mixture of proper quality. As soon as the position of the throttle permits a greater quantity of air to pass through the venturi, the priming disk is sucked up against a stop collar and no longer obstructs the flow of air.

The sizes vary from 1.5 to 2.125 inches and the prices from $40 to $55.

Webber—Only one model is made by the Webber Mfg. Co., Boston, Mass. It is a vertical type and has a single jet, opening into a strangling tube, surrounded by a float chamber. Directly above the nozzle is a conical valve controlling the fuel opening, a finger resting on the valve being linked to the auxiliary air valve. Normally the fuel valve is closed by a spring, the opening of the air valve permits the fuel valve to open also. The air valve stem is extended upward and carries a piston working in a cylinder to prevent fluttering. The use of an auxiliary air valve makes it possible to keep the fixed air opening of small size, so that a rich mixture for starting and low speeds is automatically secured. The Webber carbureter is illustrated on the previous page.

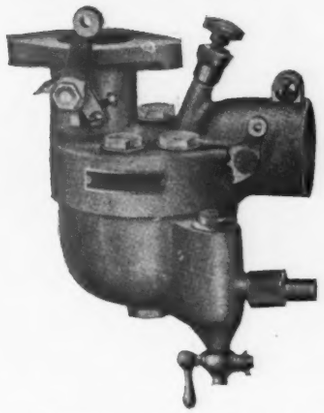
Sundermann—Outside of a slight change to make starting easier the carbureter made by the Sundermann Safety Carbureter Corp., Newburgh, N. Y., is much as it was a year ago.

It is equipped with a concentric float chamber and has a floating disk valve which raises the fuel needle against spring tension as the motor suction increases. The low-speed air entrance is at the bottom of the venturi and the area of the passage is regulated by a disk valve. The auxiliary air is taken in through circular ports around the mixing chamber. The Sunderman is illustrated in the group at the bottom of this page.

Siro—Siro carbureters are made in seven sizes varying from ¾ inch to 2 inches. Few changes have been made for the coming season, the most important being the addition of a device for easy starting. This consists of a valve that shuts off the main air thus enriching the mixture. Hot air pipes are furnished for all models.

There are two auxiliary air valves and an adjustable needle valve in the construction. The mixing chamber is U shaped, the throttle valve being at one end and a mechanically operated auxiliary air valve at the other. These valves are so arranged that when the throttle is opened the auxiliary valve opens in exact proportion to it. At the bottom of the U is an initial air tube concentric with the float chamber and in the center of this float chamber is the fuel nozzle.

The construction of the needle valve is such that it is connected with the throttle and auxiliary air valve and when the throttle valve is opened or closed, the auxiliary



Model Y Kingston carbureter, which is continued for 1915 *unchanged*

air valve as well as the needle valve opens or closes porportionately. The opening and closing of the needle valve is effected by a cam.

Newcomb—A line of water-jacketed carbureters is the feature of the Newcomb line, manufactured by the Holtzer-Cabot Electric Co., Brookline, Mass. All previous models have been built without water-jackets except the ¾-inch size. All water-jacketed models have been carried over with few changes. In addition these particular models can now be procured in aluminum as well as bronze.

The metering mechanism is located in the vaporizing chamber. It consists of a hollow plunger surrounding the fuel nozzle tube. A sharply-pointed needle valve is attached to the upper part of this plunger and controls the flow of the fuel. Around the bottom edge of the plunger a large number of small holes are drilled and these are arranged to register with an equal number of slots cut in the plunger tube or cylinder to distribute the fuel after it has issued from the main fuel measuring orifice. A sectional view is shown herewith.

The nozzle of the idling jet extends well into the strangling passage. To the left of the strangling passage there is a small air inlet whose opening can be regulated by the ratchet-locked thumb screw shown. This air can only enter the confined space around the nozzle and throughearded, one that is simple and light is the

Upper Hampton-Ford gasoline carbureter. The two at the right are the Newcomb and Sunderman

the small air inlet.

To admit of easy starting in cold weather an auxiliary fuel nozzle is provided which consists of a tube conveying gasoline from the float chamber to the small orifice just under the throttle valve. Normally, this orifice is subjected to the constant suction of the motoro whatever this may be and the bore of this orifice is so proportioned that very little fuel flows through it to the mixing chamber under these conditions; but when it is desired to start, the throttle valve is turned backward and through a slight angle bringing this orifice above the valve and subjecting it to a powerful suction.

Longuemare—New features in the line put out by the Longuemare Carbureter Co., New York, includes a horizontal type of carbureter for motors with the cylinders cast in a block, and a braking attachment for use when the car is running down long hills. In addition to the horizontal model, a vertical model is continued.

The particular features which distinguish this carbureter are an idling jet A, in the sectional diagram herewith, which is superimposed upon a working jet B in conjunction with a compensator C.

The operation of this carbureter is as follows: The fuel enters through a strainer at the extreme upper right of the float chamber and passes by the needle valve which is controlled by the float. Thence it flows through the passage D by the adjustable needle valve E which controls the opening into the passage F. The fuel also runs back into the reserve chamber C through the channel G. The fuel level in this chamber is the same as that in the float chamber and in the working jet B.

The mixture can only enter the throttle through the opening N and thence into J through the opening K. The latter is regulated by a small set screw. In this position of the throttle the fuel can only flow through the idling jet L, the fuel being supplied through a small tube which extends well below the fuel level in the working jet B.

M. F.—A carbureter of unusual design in that the float-chamber has been dis-

M. F. carbureter, manufactured by the Floatless Carbureter Co., Brooklyn, N. Y.

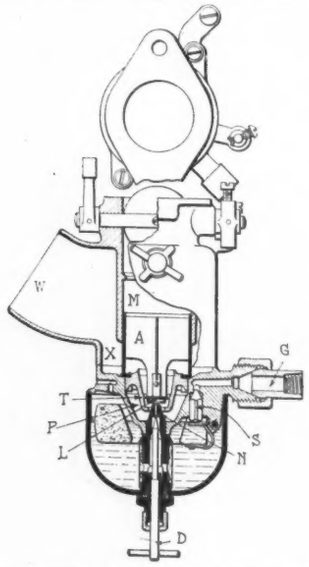
The main air inlet is at the bottom and to one side. At slow speed the air rushes up through this passage, past the spray nozzle, lifting a small disk to which is attached the needle valve which extends into the spray nozzle and controls the flow of fuel. The higher the disk and needle are raised the more fuel flows out. These two members are held down by a flat spring whose tension may be adjusted by means of a thumb screw at one side.

Parkin—The carbureter, which is made by the Light Mfg. & Fdry. Co., Pottstown, Pa., is known as the Parkin. It has no springs in its construction and there is but one air inlet. The mixture is controlled by a special type of throttle valve and a single large jet whose area of opening is controlled by the position of a cylindrical throttle.

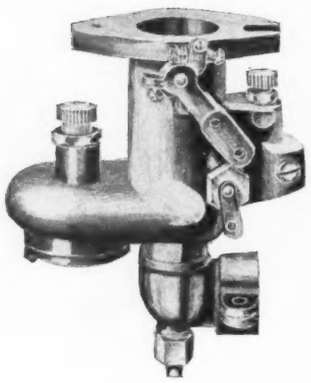
The throttle has a double function. The upper part is the throttle proper and the lower part is what is termed the variable air shutter. This lower member controls the amount of air which passes the jet by varying the area of the passageway. The rotation of the throttle also controls the opening of the single jet which is a large hole in the side of the jet tube. Over this tube is a double sleeve, the inner portion of which moves down over the jet opening as the throttle is closed. The movement of this sleeve is produced by an eccentric on the throttle which bears on the top of the sleeve.

Carter—The Carter multi-jet carbureter, now manufactured by the H. W. Johns-Manville, Co., is made in four models, known as the C, CH, F 5-16 and F 3-16. There have been no changes in the principle of operation of these instruments but a few detail changes have been made in the C and CH types.

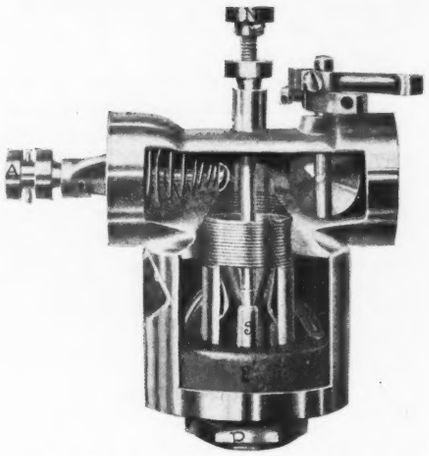
The Carter model CH carbureter is the latest development of the carter multiple-jet principle, in connection with low, intermediate and high-speed air ports



Section through the new Johnson carbureter made by the Johnson company, Detroit



The M. F. carbureter, in which the float chamber has been discarded



View of the Maco carbureter, showing the working parts

adapted to the vaporization of low-grade fuel.

The principal feature of the model CH instrument is the addition of hot air as a vaporizing agency to the mechanical vaporizing principle of the multiple-jet. The hot water jacket of the model C, which was for the purpose of keeping the throttle from freezing up in cold weather, is no longer necessary when the hot air is applied and is done away with, together with the water connection, in the model CH. The easy starting tube has been enlarged for the purpose of supplying increased fuel for starting, while the throttle levers have been changed slightly.

Development in the Field of Carbureter Sundries

WHITTELSEY-FORD Carbureter Adjuster—Because of improvements in manufacture and finish the Whittelsey Co., 11 Broadway, New York city, has raised the price of the Whittelsey-Ford carbureter adjuster from $1 to $2, filling of course such orders as already have been received at the $1 price. This device is designed to make for the proper adjustment of such carbureters as are fitted to the Ford, the Holley and Kingston. It consists of a dial which fits over the brass button which is part of the needle valve adjustment on the Ford as it comes from the factory. On the face of this dial are two series of figures, the outer one representing the mileage per gallon a Ford might be expected to do when in fair condition and over a macadam road. The inner series represents the mileage per gallon such a car would do in dirt roads. A brass pointer is supplied which indicates the settings and holds the adjustment at any set point.

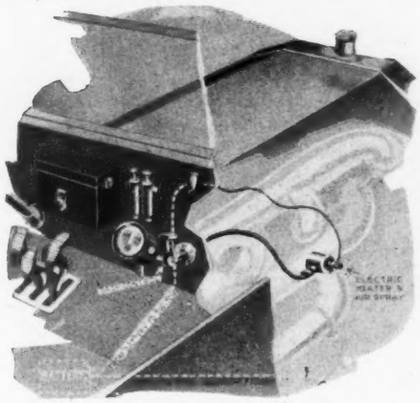
New Era Ford Reserve Gasoline Valve—The New Era Spring and Specialty Co., 870 Woodward avenue, Detroit, has a simple device which gives the Ford owners two tanks. This valve is installed between the gasoline tank and sediment trap in place of the present attachment. This traps 1 gallon of gasoline which can be used as a reserve supply. Its price complete is $1 and it can be installed in 10 minutes.

Gem Primer—The Gem primer, made by the Gem Primer Co., Springfield, O., fits into the dash and is operated from the seat. As its name implies, it aids in starting the motor in cold weather, taking the gasoline from the feed line and putting the charge into each cylinder under pressure, practically vaporizing the charge. Tubes running from the dash lead out from a common central point to the release cocks or spark plugs. A slight turn of the control opens the supply line and a single reciprocation of the piston out and in does the priming, while a slight turn of the piston closes the fuel inlet. The device sells for $7.50.

Zip Heater Plug—The Zip heater plug, made by the Zip Mfg. Co., 624 New York Life building, Chicago, is an electrical device that may be attached to nearly all makes of carbureters, heating the gasoline in the carbureter so that the gasoline will mix readily with the air in cold weather, thus facilitating the starting of the motor. It sells for $2.50.

Phoenix Gasoline Saver—Herz & Co., Puck building, New York city, is marketing the Phoenix gasoline saver, which is attached to the cover of the float chamber of the carbureter. By its use it is claimed that a saving of 25 per cent in gasoline may be had; that it makes the motor run regularly and adds to its power. The list is $4.50.

Ford Owners' Gasoline Saver and Primer—The Peerless Motor Specialty Co., 2 Columbus circle, New York city, is the manufacturer of a device which by applying hot air above the carbureter thoroughly vaporizes the mixture, giving a faster burning vapor which increases speed, power and flexibility, it is claimed. It can be attached in 30 minutes. The gasoline saver lists at $3.50; the gasoline saver and primer at $5.50 and the primer at $2.50. The same company also makes the Peerless automatic gasoline saver, list-



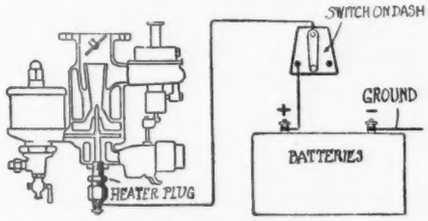
Left, the Ieco manifold plug, which allows of a thoroughly vaporized mixture to be sent to the cylinders; right, Peerless gas saver

ing at $10, which is designed for other makes of cars than the Ford.

Nyco Accelerator and Power Adder—The New York Coil Co., 338 Pearl street, New York, has brought out for Ford owners the Nyco accelerator and power adder which is installed between the carbureter and the inlet pipe without drilling or tapping. It is operated either with a foot pedal or by hand control. The former way it sells for $5, while $6 is charged for the latter.

Ieco Manifold Plug—The Ieco manifold plug, made by the Interstate Electric Co., New Orleans, La., may be used as an electric primer, an extra air inlet as a means of saving fuel and also to introduce kerosene into the cylinders in order to free them of carbon. In its action as a primer the Ieco utilizes the heat of an electric coil for vaporizing the fuel. The price is $5, ready to install, and can be operated on either a 6-volt storage battery or six dry batteries, although the company makes one for a 12-volt storage battery. The same company makes a device for warming the steering wheel which is attached without bolts or screws, lacing on and carrying the heat from the battery, consuming only 20 watts. For Ford cars it sells for $5; other cars, $7.50. The Ieco manifold plug is shown on this page, installed in a motor.

Paul Air Preheater—The Paul device is an electric heater, which is attached to the fixed air intake of the carbureter, heating the air before passing into the carbureter. It is operated by the car's starting battery or from any 6-volt source. It is utilized only for starting. It is claimed that it prolongs battery life with electric starters; that it eliminates pressure with air starters and that it saves work for those who start their motors by hand. The device lists for $8 and is made by the Fort Wayne Engineering and Mfg. company, Fort Wayne, Ind. The Paul air preheater is shown above installed in a carbureter.



Showing installation of the Paul heater

Gasoline and Oil Storage Systems

WAYNE Oil Pump—The Wayne Oil Tank and Pump Co., of Fort Wayne, Ind., is making gasoline storage and distributing systems in four models—H. and E. for public fuel stations and C. and G. for private garages. Refinements have been made in the 1915 output, the drainage having been improved so that no gasoline is left in the hose and the hose having a metal lining to eliminate any danger of rubber getting in the fuel.

Hydraulic Gasoline Pump—The feature of this system of fuel storage and distribution is that the gasoline or oil is forced to its outlet by means of hydraulic pressure and that no pump is required to draw the fuel from the tank, when either buried underground or located in a garage. This device is manufactured by the Hydraulic Oil Storage Co., Detroit and New York.

Tokheim Gasoline Storage System—This piece of garage equipment is an automatic filling and draining device made by the Tokheim Mfg. Co., of Cedar Rapids, Ia. The system consists of a storage tank, buried under ground, and a drain-back pump, located in the garage. From the pump head, a pipe runs to the ceiling and then to a point directly over the tank of the car. A signal nozzle float indicates when the tank is full and by raising the pump handle, which trips the cylinder valves, a siphon is formed which drains all surplus gasoline in the hose, pipe and pump back to the underground tank. It is effective system and one which in time will show economy in handling fuels.

Self Draining Gasoline Pump—A new feature of the Reliance gasoline storage outfits, which are shown by W. S. Sheppard, Newark, N. J., is a self draining pump which operates on the syphon principle and automatically clears itself and the pipes, when the handle is pressed down and locked. The gasoline hose used with this pump is a comparatively new product; it is of steel throughout and is unusually flexible.

Bowser Systems—S. F. Bower & Co., Fort Wayne, Ind., produces a complete line of gasoline and oil tanks and storage systems designed for both public and private garage service. Practically every form of tank is offered.

TOURING AND GARAGE TOOLS

Dudly Folding Shovel—The Dudly Tool Co., Menominee, Mich., offers an all-steel shovel of the folding type, which has a blade 6½ by 9 inches and a 3-foot handle. It makes it possible for the tourist to dig himself out quickly when stalled in the mud. In addition the blade of the shovel may be used to place the jack on when the ground is soft. The weight of the shovel is 4 pounds, and it occupies a space 12 by 6.5 by 2 inches when folded up. It is nickel-plated and sells for $3 and can be conveniently placed under the seat or in the tool box.

Basline Autowline—A strong, easily-stowed-away tow-line is a necessity in long-distance touring. Indeed, if it takes up but little room, it could well form a part of the permanent equipment of every car. Such a needful is the Basline Autowline, manufactured by the Broderick & Bascom Rope Co., St. Louis, Mo. It consists of about 25 feet of steel wire rope, to each end of which is attached a snaffle hook which permits of instant attachment to the towing and towed cars. A heavier type also is manufactured for truck work. This company also makes the Autowlock, a device for locking the car wheel to the spring or a spare tire to the rack, so as to prevent loss by theft.

Springfield Circle Cutter—The repairman will be interested in the Springfield Circle Cutter, a device manufactured by the Shawver Co., Springfield, O., with the air of which he can cut quickly and accurately lamp glass, sheet copper and rubber gaskets, felt and fibey washers, etc. This cutter has a capacity for any size circle up to 14 inches diameter, and is provided with a positive measuring scale to determine sizes.

Tool Kits for Fords—The demand for tools specially adapted to Ford cars has been met by the Billings & Spencer Co., Hartford, Conn., which is marketing a kit selected from its line. These tools are made of drop-forged steel, and are enclosed in a substantial canvas bag which may be wrapped up in a remarkably small compass.

Vulcan Electric Gearshift—The Cutler-Hammer Mfg. Co., Milwaukee, Wis., is the maker of the Vulcan electric gearshift, which automatically shifts the gears of a car by the pressure of a button on the steering wheel. This device was described in detail in Motor Age, issue of December 24.

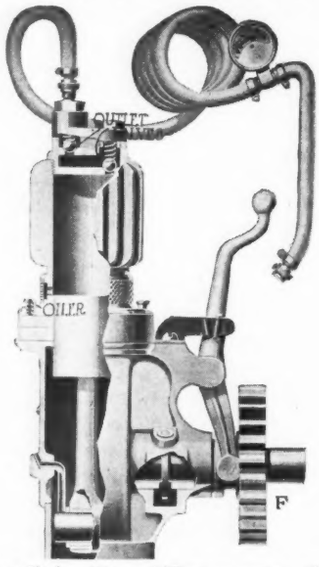
Power Tire Pumps

THE introduction of a comparatively large number of single-cylinder, large bore short-stroke pumps impresses one as being one of the most important moves made in the field of the motor-driven tire pump Beside these single-cylinder models there is a noticeable falling off in the number of four-cylinder types which are being featured by the various makers. In most instances the single-cylinder pump is small and adaptable to the Ford car or other vehicle of its type, while in others, the pump is made larger for the heavier cars. The small pumps which have been introduced invariably are air-cooled, some using flanges and others none. Poppet valves are used more than ever before for the inlet and outlet, but some makers still adhere to ball check valves while others employ a combination of poppet and ball.

In the matter of pump design, the makers have endeavored to decrease the possibilities of oil making its way to the tire through the pump. Wick oiling has overcome this difficulty to a large extent and some use the wick for oiling the piston and cylinder and also have splash for the bearings, but allow the overflow to drop out through a hole in the side of the crankcase.

With the motor-driven tire pump acceded to be a car necessity, the manufacturers have, in practically all instances, brought out special fitting to allow of their pumps being fitted to the older makes of cars. The fittings for the new cars have been improved so that there is not the complication there was formerly and less work is required for installation.

Because of the great competition in this branch of the industry prices have come down steadily, especially in the Ford types in the single-cylinder models and spark-plug pumps.



Single-cylinder Stewart-Warner pump, showing screened inlet and ball control valves

Kellogg—Six different styles of motor-driven tire pumps comprising one, two, four and six-cylinder models are being manufactured by the Kellogg Mfg. Co., Rochester, N. Y., the leaders of the 1915 line being the newly announced one-cylinder type, model 101 and model 111, a single-cylinder Ford types selling at $7.50 complete with special timer case cover.

The Kellogg model 101 is of all metal construction and is air-cooled but uses no cooling flanges. Both inlet and outlet valves are of the poppet type and mounted on top of the cylinder as shown in the interior view herewith. Unique construction is used throughout the entire pump, there being two bronze connecting rods instead of one and two special piston guides attached to the crankshaft, which make it unnecessary for the cylinder to act as a guide for the piston. The interior view shows the piston with its two rings, below it the two connecting rods R and above it the valves P. One of these has an inside seat and the other one on the outside, the former being the inlet and the other the exhaust. When the piston goes downward the inside valve opens and admits air which is forced out through the other valve on the return of the piston.

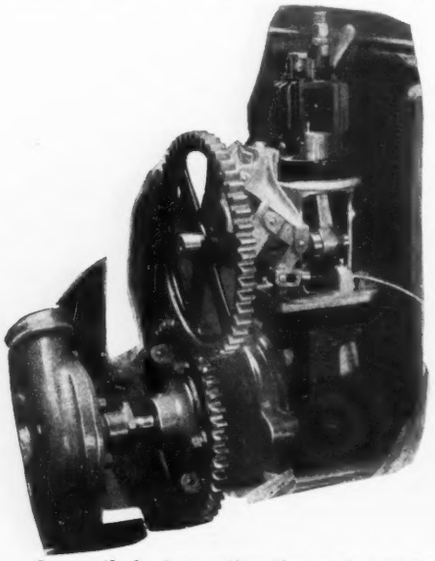
The crankshaft is a drop-forging supported by two bronze bearings fitted to the crankchamber, which is made of aluminum.

The lubrication of these bearings is by splash but the cylinder and piston are wick-oiled. This is accomplished by the wick W, which is compressed every time the piston finishes its down stroke, a little oil then being carried by the piston and spread over the cylinder wall.

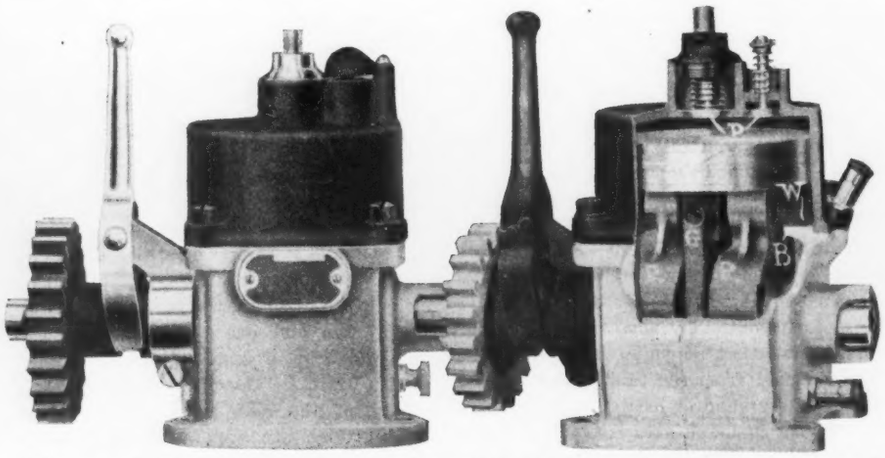
In order to prevent oil from the splash from getting into the air chamber the baffle plate B is provided, which acts as a shed causing all splashed oil to drop back to the crankcase again.

This pump is attached to the motor at any convenient place and is thrown into mesh by a hand lever which actuates a gear as shown in the illustration.

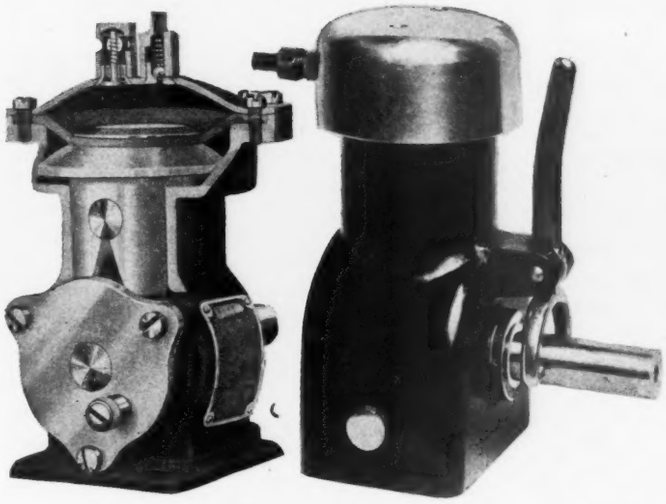
Cylinder dimensions are 3 by ¾ inch and the pump is said to be able to inflate a 34 by 4 tire to 80 pounds in about 2



One method of mounting the single-cylinder Stewart pump. The illustration shows the pump driven from the water pump shaft



Exterior and interior views of the new one-cylinder Kellogg. W shows the oil wick and B the baffle plate for preventing oil from reaching the piston and cylinder. Notice the poppet valves P for both inlet and exhaust



The left illustration shows a section of the Taylor Noil, a diaphragm type of pump. At the right is the new one-cylinder Lipman, which sells for $15

minutes. Its price, including gauge, hose and all necessary attachments, is $15.

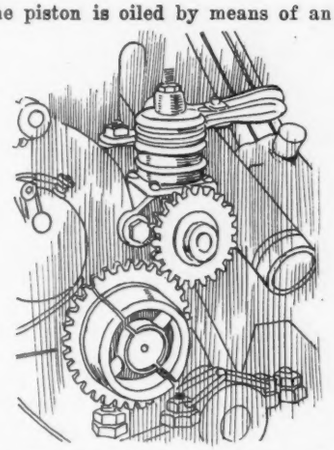
The new Ford pump, model 111, has just been brought out and it is of all-metal construction using bronze connecting rods and bearings. It can be installed without interfering with the fan or radiator, and without drilling. A new Ford timer case is furnished with the pump, which is air cooled but uses no cooling flange.

Stewart-Warner—Three single-cylinder models are made by the Stewart-Warner Speedometer Corp., Chicago, Ill. The bore of all three is 1.44 inches, the stroke of two models is 2.5 inches and that of the third is 1.75 inches. The normal speed is 600 r. p. m. and a maximum pressure of 400 pounds may be obtained.

The cylinder is cast iron using vertical cooling fins. The base of the pump is aluminum and the piston is steel, hardened, ground and lapped. The connecting-rod also is hardened steel. Compression is maintained by making the piston a tight fit. There are no rings.

Air is taken in through an annular series of holes uncovered by the piston near the bottom of the stroke. The discharge is at the top, there being two spring-closed ball valves in series. The use of two valves eliminates all possibility of leakage. If one valve should be held open by a piece of dirt, the other valve would still prevent the leakage of air back into the pump. The air inlet is screened to prevent the entrance of dust and dirt.

The piston is oiled by means of an oil-soaked wick against which it rubs. This wick is supplied with lubricant through two filler holes which are conveniently reached from the outside. This method of oiling gives all the oil required and yet there is no excess to be carried over to injure the tires. There is but one main bearing and it is oiled by a ring oiler which is situated at the center of the bearing. The ring dips into a small well which is filled through an oil hole. The connecting-rod bearing is oiled through a hole in the end of the pump, this hole leading to a tube which rotates with the crank-pin and thus delivers its oil by centrifugal force. The bottom of the crankcase is open so that any free oil will immediately drop out.



A new Manzel for Ford cars, and its method of mounting. Its price is $7.50 complete

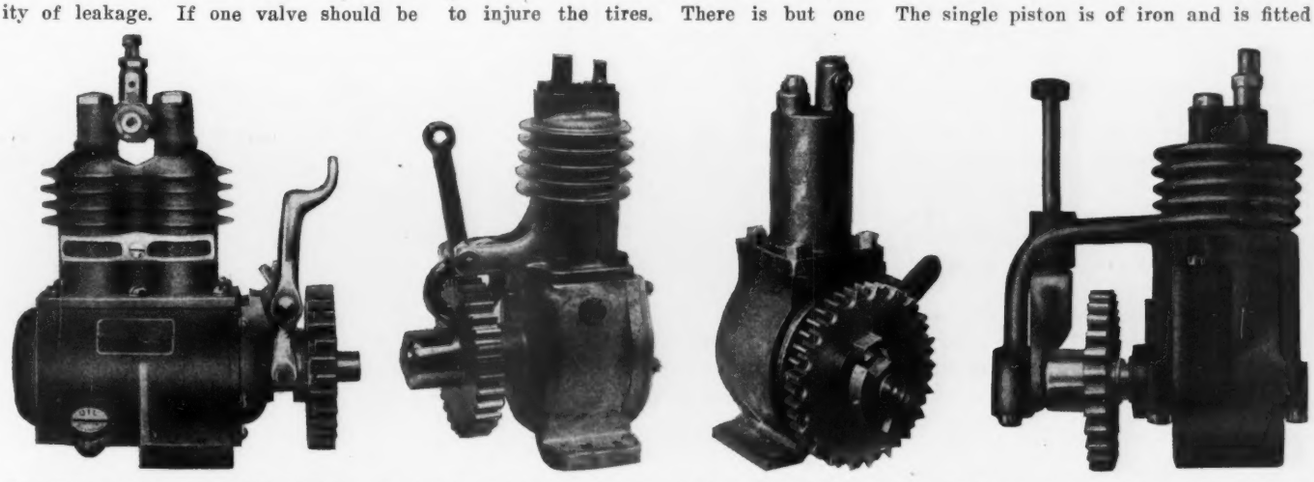
The price complete with bracket and gears for immediate installation, 13 feet of hose and an air pressure gauge, is $15.

Manzel—A single-cylinder, air-cooled gear-driven tire pump for Fords is the new feature of the line made by Manzel Bros. Co., Buffalo, N. Y. The two-cylinder model is continued.

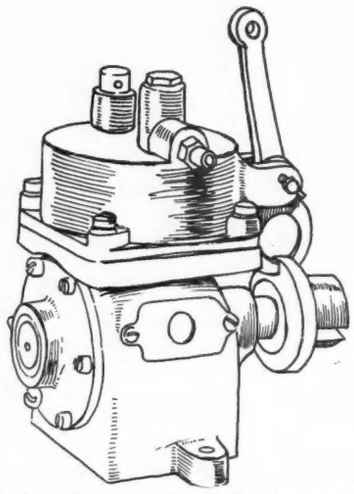
The Ford model sells for $7.50 complete with steel gears, 12 feet of hose and gauge and everything for installation. It will inflate a Ford tire in about 1½ minutes and it can be installed in 45 minutes. No machine work of any kind is required. The pump is mounted at the left of the motor and just above the crankshaft, as shown in the illustration herewith. The fan pulley on the crankshaft is removed and the split gear put in its place and this drives the pump which is bolted to the crankcase. The split gear also incorporates the fan pulley. When the pump is not operated the gear is out of mesh.

The two-cylinder Manzel model has a gear drive and is made for all standard cars for $20. The cylinders and pistons are gray iron and the piston rings are also of iron. Bronze connecting-rod bearings are employed and the crankshaft is drop-forged. The air inlet is screened and there is an air filter to eliminate oil and secure pure air for the tires.

Lipman—An entirely new single-cylinder pump, selling at $15, is being featured by the Lipman Air Appliance Co., Beloit, Wis. This new pump which has just been announced, is an all metal type with inlet and exhaust valves in the head, which is covered with a neat cylindrical plate as shown in the illustration herewith. The single piston is of iron and is fitted



From left to right: Manzel two-cylinder, showing the safety valve between the tops of the cylinders; Ten Eyck, a new one-cylinder design listing at $15; Hartford Machine Screw Co.'s latest pump, the one-cylinder Master; Sanford, a new single-cylinder pump for Ford cars



Exterior of a new type of Kingston pump brought out by the Kokomo Electric Co.

with eight steel rings to insure that no air leaks past it. The cylinder also is of gray iron while the crankshaft is of drop-forged steel operating on two plain bearings. The bore and stroke are 2 by 1¼. The oiling system is splash and an opening is provided in the crankchamber so that the level is kept constant, the excess oil running out through the opening.

The pump weighs 5½ pounds and is fitted with a hand shifter for throwing the pump gear in mesh with one on an auxiliary motor shaft.

The Lipman company also is marketing its four-cylinder pump unchanged. This sells for $25 and has a bore and stroke of 1¼ by 1¼. It is of all metal construction, using gray iron cylinders and pistons, a drop-forged steel crankshaft and poppet valves for inlet and exhaust, located in the head. The valve mechanism is completely inclosed by a plate.

Kingston—An entirely new type of pump has been brought by the Kokomo Electric Co., Kokomo, Ind., maker of Kingston specialties. It has a single cylinder with 3-inch bore and ¾-inch stroke. Two piston rings are used. The intake valve is a poppet type and the exhaust valve is a spring-seated ball. Its normal speed is 500 r. p. m., when it will inflate a 34 by 4 tire in 4 minutes. It is capable of generating pressures up to 125 pounds. The pump is air cooled but uses no cooling flanges.

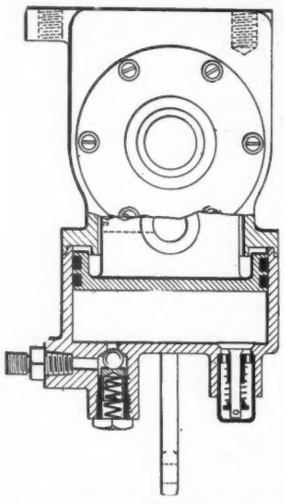
Master—Under the trade name of Master the Hartford Machine Screw Co., Hartford, Conn., is producing two power tire pumps for 1915. One is a single-cylinder design and the other a two-cylinder one. The one-cylinder model, is a new one while the two-cylinder is carried over from last year.

The new pump has a bore and stroke of 1.5 by 1.75 inch and will inflate a 34 by 4 tire to 80 pounds in 2¾ minutes when running at a speed of 600 r. p. m., which is the speed recommended. The overall dimensions are 4.5 by 8.5 by 5.75 inches, and the weight 8 pounds.

The cylinders on the two-cylinder type measure 1.375 by 1.75-inch, the weight, 10.5 pounds, and the overall dimensions, 4.5 by 8.5 by 7.25 inches.

Master pumps are air-cooled and may be gear or clutch driven. The pistons are steel, hardened and ground to size. Lubrication is by splash. The inlet valves are a flat type and the discharge valves ball.

B. B.—The twin-cylinder vertical pump made by Herz & Co., New York, will be



Interior of the new Kingston, showing the poppet valve for inlet and ball for exhaust. It is wick oiled

continued without change. It is known as the B. B. and will inflate a 34 by 4 tire in less than 1 minute when operating at its normal speed of 375 r. p. m. The cylinder dimensions are 1.375 by 2.5 inches. The weight is 7 pounds and the price is $30. Pressures up to 250 pounds can be obtained.

Lubrication is by splash. The intake and exhaust valves are contained within housings screwed into the cylinder heads and are easily removable for inspection. A safety valve placed in the discharge line makes it impossible to pump to more than a predetermined pressure into the tire.

The drive is by coupling, gear or sprocket wheel and chain, and a clutch for starting and stopping the pump is furnished when desired. In attaching the pump it is necessary, in some cases, to fasten a strap or iron plate from the chassis to the motor base and attach the pump over the water pump shaft, drive being by means of silent chain. In other cases it is better to cut through the crankcase and drive the pump from the timing gears direct. Another method of mounting is on an iron plate in front of the gearset, the pump being driven from the clutch shaft by silent chain.

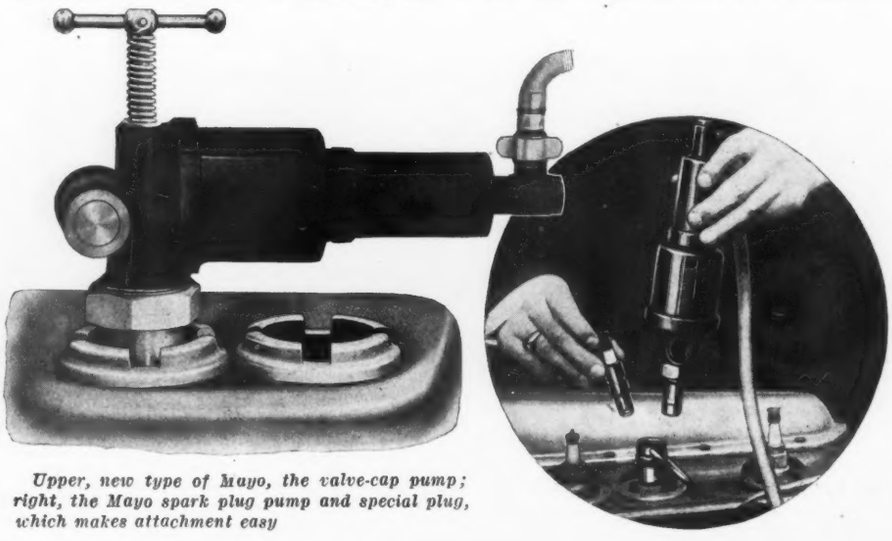
Advance—The Advance Machinery Co., Toledo, O., is specializing on two pumps for 1915, the Advance-Toledo, a single-cylinder engine-driven pump of 6 cubic inches piston displacement and the Advance-Ford, a two-cylinder model for Fords only. The Aero models of two and three cylinders will be continued also. The Advance-Toledo has a bore and stroke of 2 3/16 by 1⅝-inch and the Advance-Ford, 1.125 by 1 inch. The Aero pumps have cylinders 1.375 by 1.625 inch.

All of these pumps are designed to be driven at engine speed, giving their best service at 375 r. p. m., but having an operating range of 300 to 500. The Advance-Toledo will inflate a 34 by 4 tire in 2 to 2.5 minutes at an engine speed of 350 r. p. m. The Ford pump will inflate a Ford tire in 2 minutes at an engine speed of 500 to a a pressure of 65 pounds.

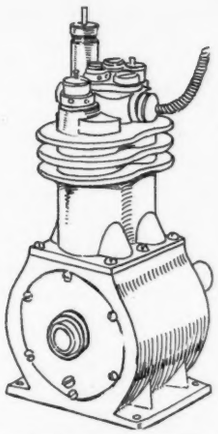
The Advance-Ford is the newest model. The cylinders are of special gray iron. The pump cylinder is of the double-end compression type with a single piston driven by a yoked connecting-rod with a straight line drive, thus eliminating the side thrust of the piston against the cylinder walls.

The ported type of intake has been adopted. Narrow ports are used. The cylinder heads are removable and are carefully machined so that the clearance space is not over 1/32-inch. The cylinder is lubricated by wicks located in the middle of the body.

Ten Eyck—An entirely new design of single-cylinder air pump has been brought out by the Auto Air-Rotar Co., Chicago, Ill. It is known as the Ten Eyck and has a bore and stroke of 1.75 by 2.25 inches.



Upper, new type of Mayo, the valve-cap pump; right, the Mayo spark plug pump and special plug, which makes attachment easy



B-B, a twin-cylinder vertical pump made by the Herz company

It operates at speeds of from 300 to 800 r. p. m., and will inflate a 34 by 4 tire in 2 minutes at 600 r. p. m.

The bed plate of the pump measures 2.5 by 4.25 inches and the pump is generally mounted on a small steel forging bent at right angles and bolted to the inside of the frame on a line with the front end of the motor. The pump measures 10 by 5 by 4.5 inches and weighs 10 pounds.

The price, including 16 feet of rubber tubing, pressure gauge and tire connections, is $15.

Taylor Noil—The pump made by the Taylor Mfg. Co., Chicago, Ill., differs from other pumps on the market in that a diaphragm is used instead of a piston. The adoption of this construction effectually prevents oil from making its way into the tires as the diaphragm separates the air chamber from the rest of the pump. Compressed air is obtained by reciprocating the diaphragm in much the way a piston might be used. The intake valve is a poppet and the exhaust valve a ball and their location is shown in the sectional view of the pump, illustrated on another page.

This pump is designed to be installed under the hood and is to run at a speed of 550 r. p. m., when it will inflate a 34 by 4 tire in from 3 to 3.5 minutes.

The improvements in the new model are in the plunger which now works straight up and down without any side motion and in the valve fittings which now are finely machined instead of being rough castings as heretofore.

The height of the pump is 7.25 inches and the width across the top is 5 inches.

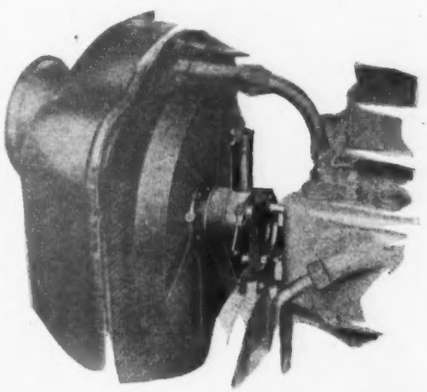
Peerless—One model of engine-driven pump will be made by the Peerless Accessories Mfrs., Chicago, Ill., for the coming year. This is a four-cylinder design with 1.375 by 1.625 inch cylinders. It is run at a speed of 400 to 450 r. p. m. This pump can be attached without special fitting to any car with 1.25 inches of exposed magneto shafting and room for a 4.25-inch sprocket.

The cylinders are cast iron, and so are the pistons and rings. Bronze valves are used. The pump is mounted on a small steel bracket.

The price complete with gauge mounted on dash, dash control lever, and other necessary fittings is $21.

Hanna—Hanna power tire pumps are built in two sizes, both twin-cylinder air-cooled models. The maker is the Troy Auto Specialty Co., Troy, N. Y. The smaller pump style C, has a bore and stroke of 1.5 inches and a normal speed of 500 r. p. m., and the D has the same bore but a stroke of 2 inches. Its normal speed is 650 r. p. m. The prices of these two models are $25 and $35 and they may be fitted to any machines having exposed shafts.

Medina—The Medina Machine Co., Medina, O., is making a single-cylinder pump which is driven by the fan belt being mounted in the place of the fan shaft. No machine work is required to install it. The operation is simple, the regular fan together with the pulley is removed and a pulley furnished in connection with the pump is put in its place. The price of this outfit complete with all the necessary brackets and attachments and 12 feet of hose is $12.50. The Medina is illustrated on this page, installed in a motor.



Medina pump which is driven by the fan belt. No machine work is required to install it

Dewey-Anderson—The Dewey-Anderson Mfg. Co., Toledo, continues to make in unaltered form its impulse tire pump which is designed to be screwed into one of the spark plug holes, the engine then doing the work by means of the compression in the cylinder to which the pump is attached.

The Dewey pump differs from others of the type in that the piston is stationary and the cylinder moves. That is, the compression pressure of the motor is applied to the cylinder of the pump, and there is no connection between the engine cylinder and the air supply going to the tire. This would be detrimental, for gas and oil are injurious to rubber. The air from outside is taken directly into the air chamber of the pump, and there compressed by the pressure in the engine cylinder. The Dewey is shown herewith.

The pump will inflate a 34 by 4 tire to its required pressure in 3½ to 4 minutes, or a 32 by 3½ tire in 2½ to 3 minutes. The pump weighs under 4 pounds, is about 12 inches long, and comes complete with 12 feet of hose, self-opening connections, pressure gauge and adapters for attachment to any make of car. The price is $8.

Folberth—The Folberth is a spark-plug type of pump, with two cylinders and is unique in that there is a mechanical connection between the top of the piston of one cylinder and the piston of the power tire pump. The pump piston rod extends down through the cylinder head and rests on the piston. The upward movement of the piston raises the pump piston and when the upper limit of the stroke is reached, the piston and rod are returned by the air pressure on the upper side of the pump piston and the suction on the lower side. The intake air valve is a poppet type and the exhaust valve is a ball.

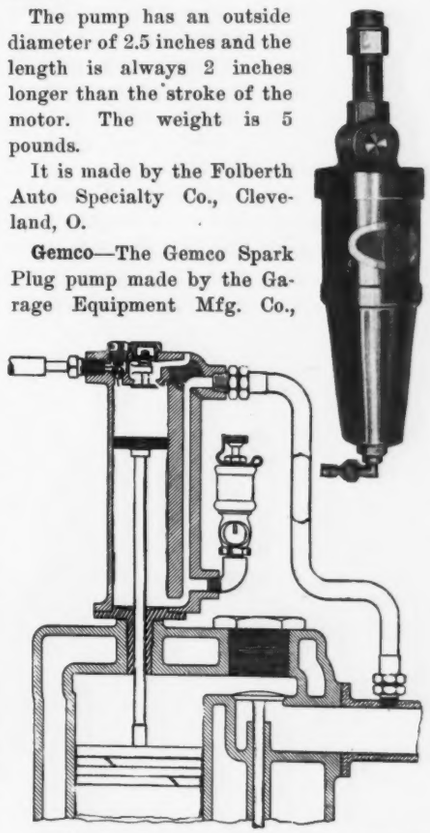
The advantages claimed for this type of pump are that high capacity is obtained without racing the motor, there are a minimum of moving parts, silence of operation and the delivery of clean air, untainted with oil. The operating speed is 300 to 400 r. p. m.

The pump is manufactured in only one model, the bore being 1.5-inch and the stroke being equal to that of the motor on which it is installed. The speed should never exceed 500 r. p. m., and at 400 it will inflate a 34 by 4-inch tire in 2 minutes.

The pump has an outside diameter of 2.5 inches and the length is always 2 inches longer than the stroke of the motor. The weight is 5 pounds.

It is made by the Folberth Auto Specialty Co., Cleveland, O.

Gemco—The Gemco Spark Plug pump made by the Garage Equipment Mfg. Co.,



Section showing the interior of the Folberth pump, the piston rod of which extends down into the cylinder of the motor; upper right, the Dewey spark plug pump

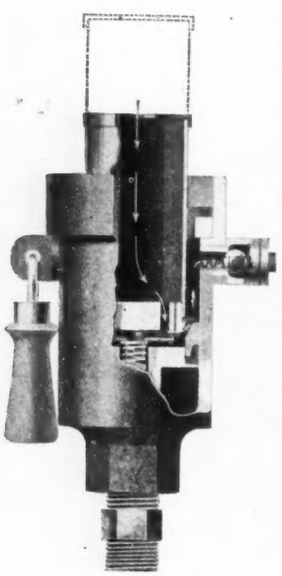
Milwaukee, Wis., has undergone practically no change in the past year. The price of the pump without gauge is $10 and with gauge $12. The equipment includes 12 feet of hose and the necessary connectors and adapters.

National—The spark plug pump manufactured by the National Motor Supply Co., Cleveland, O., has undergone little change since 1914. This pump, illustrated herewith is called the National Telescope and is made in two sizes, one for small cars and the other for large ones. In the former the bore and stroke measure 4 by 1¾ and in the large size, 3 by 2¼ inches. The pump weighs 5 pounds and will inflate a 34 by 4 type to 80 pounds pressure in 3 to 4 minutes.

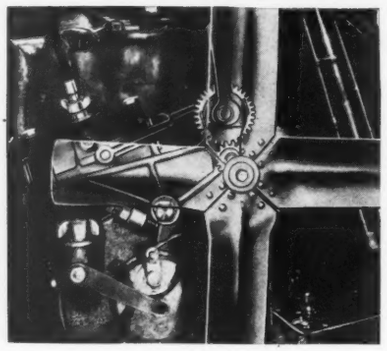
Mosco—This pump, a Ford type, manufactured by the Motor Specialties Co., Waltham, Mass., is a single-cylinder design mounted on the front cover of the timing gear case and driven from an eccentric. The price is $7.50 complete with 15 feet of hose and $1.50 additional is asked for a 150-pound pressure gauge.

Mayo—Two new models have been brought out recently by the Mayo Mfg. Co., Chicago, Ill. These are the valve cap pump, which is similar to the spark plug pump in its principle of operation, the only difference being in the method of attachment, it being permanently fastened to the valve cap instead of screwing into the spark plug hole. The other new model is the Mayo-Ford pump, which is a spark plug type, but smaller than the original spark plug pump which is continued.

With the valve cap pump a 34 by 4 tire can be inflated to 75 pounds pressure in 3 minutes. Upon finishing the inflation a quarter turn of a handle closes a ground poppet valve opening into the engine cylinder, cutting out the pump and allowing the motor to resume firing on this cylinder. The hose is removed and stored in the tool box. The outfit includes a gauge and 14 feet of hose, and the price is $15. The obvious advantage of this type of pump is that it is not necessary to remove a spark plug and attach the pump every time air is wanted.



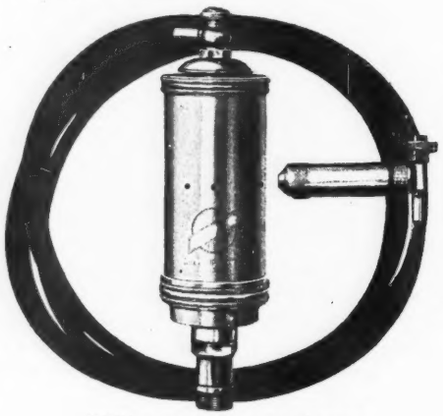
Above is shown the National telescope pump and to the right is the Brown spark plug pump, the price of which has been reduced from $15 to $12



Advance-Ford, showing the method of mounting

The large spark plug pump sells for $10 with 12 feet of hose and gauge, and the Ford outfit sells for $8 with 10 feet of hose and gauge.

Utility—Two spark plug pumps are made by the Hill Pump Valve Co., Chicago, Ill. One is the Utility and the other the Utility Jr., the latter being for cars with tires of 3.5 inches and under, this class including Fords.



Utility spark plug type of pump

The large pump has cylinders 2.25 by 1 1/32-inch and measures 6.75 by 2.62 inches. It weighs 5 pounds. The small pump has a cylinder 2 by 1.25-inch, measures 6 by 2.25 inches and weighs 3.5 pounds.

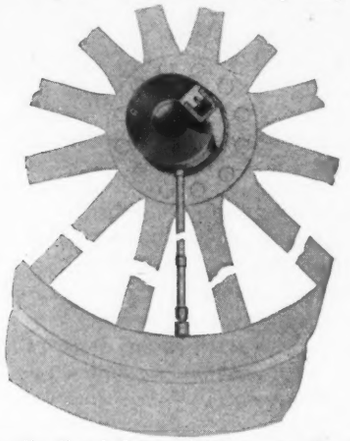
The large pump will inflate a 34 by 4 tire to 80 pounds in 3 minutes and the small pump requires 3.25 minutes.

These two pumps are furnished with a safety valve and gauge which is installed in the line running to the tires and which is known as a Pneu-Meter. The Utility pump complete with this safety device sells for $12 and the Utility Jr. for $9.

Brown—Price reductions have been made on the two Brown models, the Impulse tire pump selling for $12 now instead of $15 and the Brown Jr., for Ford cars for $5.50 instead of $7. The latter price includes tee and gauge also.

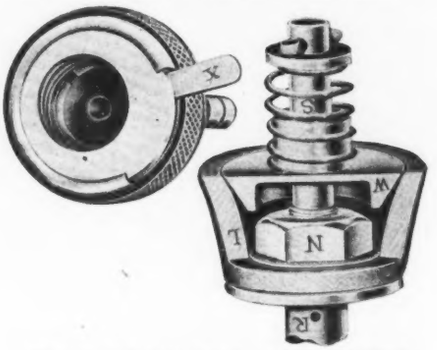
The Lewis-Sanford Pump Works, Boston, Mass., has been purchased by the Brown Co., which is located in Syracuse, N. Y., and a single-cylinder gear-driven pump will be made in this factory for $8.50 with gauge, hose and split gear. This price is for the Ford installation. In addition attachments will soon be ready for Overland, Buick and Maxwell cars, the equipment for these cars listing at $10.

Bell Pump—A hand tire pump of more than passing interest is that made by the Bell Pump Co., Detroit, Mich. The special points about it are the plunger and the hose clamp which makes it very easy to attach the end of the hose to the tire valve. The end of the plunger rod is threaded and this provides for the holding of the plunger leather between two washers by a nut. Underneath the plunger leather a bevel-edged brass spreader disk is sleeved upon the plunger rod and held to it at all times by a spring which in turn is held in place by a cottered washer on the rod end. When the plunger is forced down, the back pressure of the air in the pump barrel forces the spreader disk up strongly against the plunger leather and holds it closely to the walls of the barrel.



Automatic tire inflator which pumps the tire while the wheel is revolving

Automatic Tire Inflator—Inflating tires while the car is in motion is the object of the Automatic Tire Inflator made by the D. L. Davis Mfg. Co., Chicago. This device, shown herewith, consists of a pump, which forces air through a tube to the axle and is passed from the latter to the wheel through a special joint. This joint consists of two circular disks or faces, which revolve upon one another, one disk being fixed in the hub of the wheel, revolving with it, while the other is attached to the axle.



Plunger and hose clamp of the Bell pump

Shock Absorbers and Spring Oilers

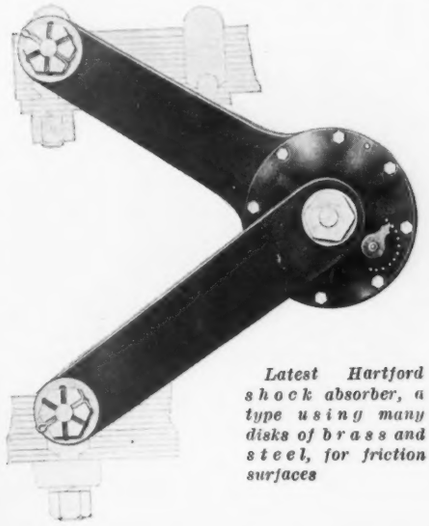
PERHAPS the most important movement of the year in the shock absorber field has been the multiplicity of types brought out, especially for the Ford car. There now are more of these than there are regular types and the majority of them are of the barrel-form, employing one or two coil springs. The older makers have improved their instruments so as to make the casing more proof against the entrance of dirt and water and in many cases the metals have been improved upon so that they will stand up better against hard usage.

Prices on the whole are less than they were a year ago, due, no doubt, to the increased competition caused by the coming in of new concerns. The latter in most cases have introduced a Ford-type of shock absorber.

Hartford—The Hartford Suspension Co., Jersey City, N. J., which, for 1915, is marketing its absorbers under the name of Hartford instead of Trauffault-Hartford, has recently added a new type to its line. This new Hartford is of the scissors type and in its actions, in part, resembles a disk clutch. It employs five steel and six brass disks. The primal object of this shock absorber is to automatically proportion the frictional resistance to the degree of shock transmitted to the car. In action the disks come into play progressively, that is, a slight shock causes two brass disks and one steel, between them, to offer resistance, while further shock causes two more disks to become effective and so on to the capacity of the absorber.

The new Hartford is shown in an illustration herewith, the eleven disks being located in the circular portion at the right. The outer ends of the arms are attached in the usual way, the upper one to the frame and the lower one to the spring or axle.

The Hartford cushion spring is another product of this concern, but this shock absorber is of the barrel type and consists of two flexible spiral springs, one within the other and both in a common housing, which is of rather large diameter. The object of the spiral springs is to take up the shock transmitted to the axle, by means of compression. In normal operation these springs are said to compress and expand, leaving the car body stationary.



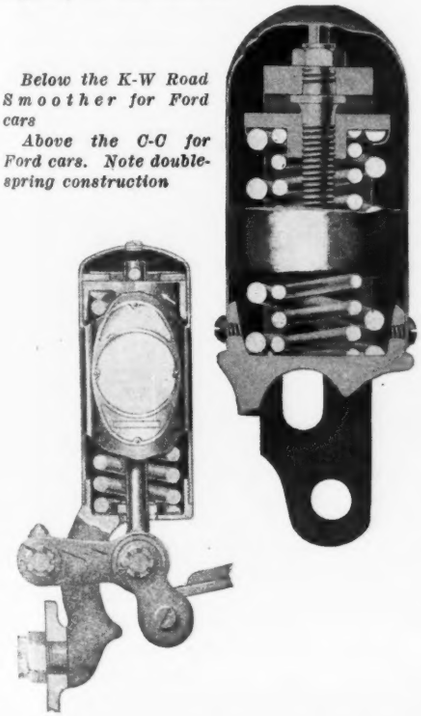
Latest Hartford shock absorber, a type using many disks of brass and steel, for friction surfaces

When heavier road shocks are encountered, the cushion springs take up the first part of the axle movement until their limit of compression is reached; then the main car springs come into action and absorb the remainder of the movement and shock.

Sager—The J. H. Sager company, Rochester, N. Y., which recently announced a new shock absorber called the J. H. S., has added a Ford type to its line. The new Ford type is called the Sager-Ford, sells for $7 per pair, and consists of a single cylinder within which operates a rather heavy coil spring. This spring has within it a stout two-piece rod, which causes the spring to compress and relax with the movement of the vehicle springs. The Sager-Ford is shown herewith.

The J. H. S. absorber, which was brought out by this concern in the summer of 1914, is made in double and single-cylinder form and in all sizes, with a special one for Ford cars. The interior employs a single spring for each cylinder and upon rebound of the car spring the absorber spring is compressed, thus taking up the shock. The casing is filled with cup grease and is water and dustproof. Prices of the J. H. S. are $8 per pair for the single-tube type for small cars, and $25 per pair for the twin-cylinder for large cars.

C. C. and E-zer—The Cox Brass Mfg. Co., Albany, N. Y., is featuring for 1915 its C-C shock absorber for Ford cars, but also is marketing the Cox rebound E-zer. The C-C is a single-barrel type, using two helical springs, one within the other. This absorber takes the place of the Ford shackles. In action the outer or stiff spring takes the weight of the car and at the same time absorbs the shock produced by road irregularities. The smaller spring within this one is an auxiliary and when the car springs receive a severe shock both springs come into action. The interior construction of the C-C is shown in an illustration herewith. The price is $8 per set of four.



Below the K-W Road Smoother for Ford cars

Above the C-C for Ford cars. Note double-spring construction

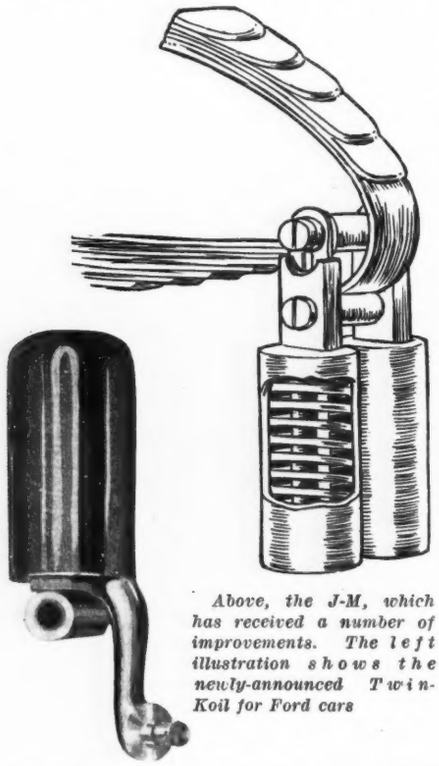
Above the Westinghouse pneumatic type. The air chamber is made in two sections, which telescope into one another

Below the latest Sager, called the Sager-Ford

The rebound E-Zer is another barrel type marketed by this concern. It has within its casing a single coil spring, the upper end of which is fastened to a strap which runs down through the center of the coil to the axle or part of the vehicle spring. On the rebound of the car spring the absorber is lifted upward, but the strap pulls the absorber spring down, thus compressing it and causing the vehicle spring to return to normal position gradually. The price is $15 per pair.

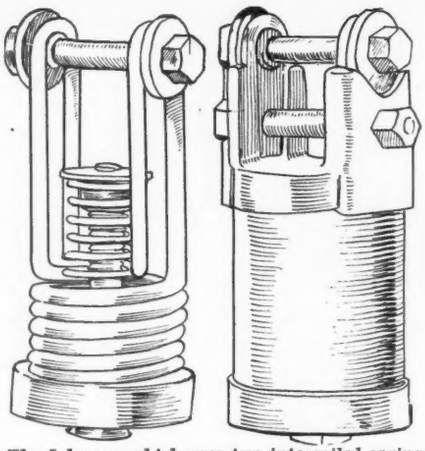
J-M—While the H. W. Johns-Manville Co., New York, has not departed from the standard construction used in its shock absorbers, the details have been changed. Two springs are used in parallel casings. Vibrations are transmitted to the coil spring by two U-shaped bolts, the loops of which rest on a pin or bolt in the lower leaf spring eye, while the ends pass through plungers or disks at the opposite ends of the springs. These U-bolts slide in long guides projecting from the tops of the cases. The cases in former models were of steel tubing, the covers carrying the guides were of bronze, the guides were of bronze and the plungers under the springs, leather-packed steel stampings. In the new models each cylinder together with its cover and guide housings is a one-piece pressed-steel job; the guides are of very hard gray fiber inserted in the housing, and the plungers are of the same material.

One result of these changes is that the weight has been reduced 8 pounds per set,

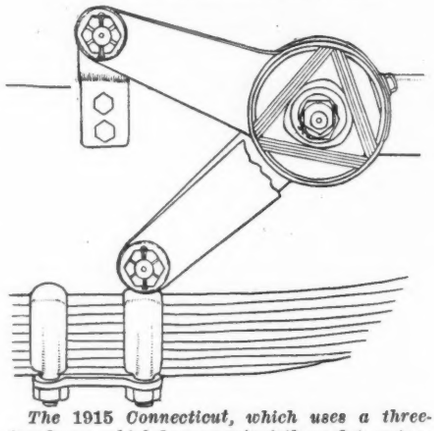


Above, the J-M, which has received a number of improvements. The left illustration shows the newly-announced Twin-Koil for Ford cars

while the balance is better, there being considerably less overhanging weight. The fiber bushings wear at least as well as the bronze and when worn out can be removed and replaced easily.



The Johnson, which uses two intercoiled springs and a lighter one in the center of them



The 1915 Connecticut, which uses a three-faced cam which bears against three flat springs as shown

The Ford shock absorber is a new model and is of the single spring construction and has the same pressed steel casing and the same flat-steel coil spring as the larger model. The casing is rigidly supported by the spring lug on the axle to prevent side sway. Only steel forgings are used for the parts subjected to heavy strains.

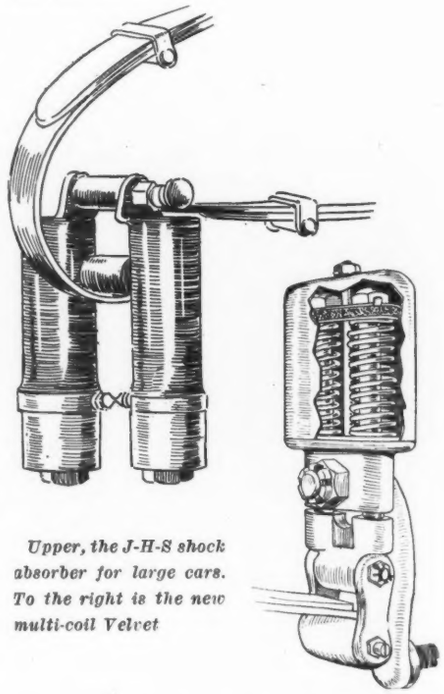
The price of the twin-spring type of shock absorber is now $30 per set of four instead of $35. The price of the Ford type is $25 per set of four, or $15 for the rear wheel pair.

K-W Road Smoother—The K-W. Ignition Co., Cleveland, O., offers its K-W Road Smoothers for Ford cars practically unaltered for 1915. This shock reliever is in the form of a single chamber containing a coil spring above which is an air chamber. The top of the spring has a small piston fastened to it so that on the rebound the spring action is checked by the movement of the piston against the air cushion. The ease of attachment is a decided feature of the K-W, requiring only the removal of the present spring shackles. The price is $15 per set of four.

Gabriel—For 1915 the Gabriel Horn Mfg. Co., Cleveland, O., offers its Gabriel Rebound Snubber unchanged. This rebound check consists of a leather strap fastened at the lower end to the axle, as shown in an illustration herewith and extending upward to a casing within which the strap is coiled. In the center of the coil is a spring with brass shoes at its end. As the car springs compress, the spring within the coil expands and takes up the slack in the belt. On the rebound, the coils of belting begin to tighten and create friction on the band of brass between them, thus forming a resistance that increases gradually as the coil compresses the spring within it. This action steadies and controls the car springs, and causes them to regain their normal position gradually without jerk or abrupt stop.

Ames—This is of the simpler types of shock absorbers and is made by Clarence N. Peacock & Co., New York. It consists merely of an inverted three-leaf spring fastened to the main leaf of the vehicle spring, as shown in the illustration herewith, and between it and the spring is a spacing block. Recoil absorption is accomplished by the action of the vehicle spring against the Ames and vice versa, the shock traveling from one to the other until it finally has a zero value. The ease of installation becomes apparent from a glance at the illustration. Prices are $8 per pair for those 1¼ inch wide and $15 for the 2½-inch size, there being intermediate sizes with prices in proportion.

Temco—The Temco Electric Co., Leipsic, O., offers its shock absorber for Ford cars unchanged for 1915. The Temco is a single-barrel type with the housing containing two coil springs, which do not touch the housing. One of these springs is within the other and on severe rebound both of them come into play. The illustration herewith shows the interior construction. Installation requires only the removal of the regular spring shackle. The price is $15 per set of four.



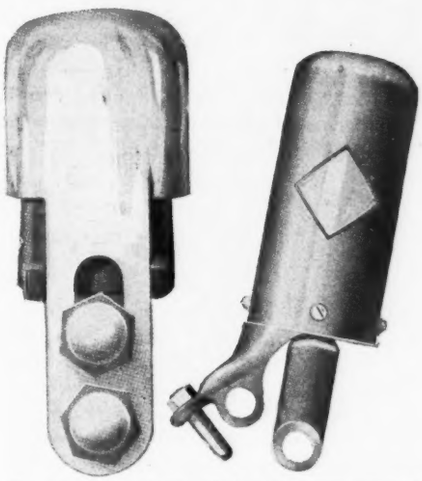
Upper, the J-H-S shock absorber for large cars. To the right is the new multi-coil Velvet

Gemco—This absorber, made by the Garage Equipment Co., Milwaukee, Wis., for Ford cars, is called a pneumatic-spring de-

vice by the concern, for the reason it not only employs a spring, but has in addition an air cushion at either end of the cylinder, in which the spring operates. These air cushions, it is stated, prevent too rapid action of the spring. The illustration herewith shows the interior of the Gemco. The price is $15.50 per set of four.

Velvet—Besides marketing its regular Velvet shock absorber in improved form, the Blackledge Mfg. Co., Chicago, has brought out a new type for Ford cars, which sells for $15 per set of four.

The most important changes in the heavy-car type absorbers has been in the method of fastening the cylinder covers. This has been improved so as to prevent rattling. The possibilities of wear have been decreased by extending the self-lubricating sliding block.

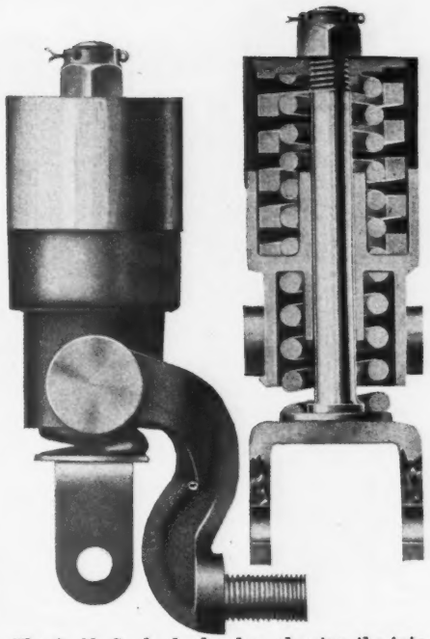


Two new Ford types, that at the left being the New York and at the right the Halladay

The new Ford Velvet, shown herewith, is a single-cylinder type, using two springs, located side by side, and each having its own control rod running through the center. The method of attachment is very simple, it is stated, requiring no machine work.

New Era—This is a barrel-type, using a double-spiral spring operating in a dust and waterproof casing. In action, the small shocks are taken by one spring and as soon as the extent of the shock becomes greater the second spring comes into operation. The springs are laced one within the other, the outer one being stiffer than the inner and taking the heavy shocks. The price is $5 per set of four, and it is made by the New Era Spring Co., Detroit, Mich.

The E-Z Rider—The Forest City Electric Co., Cleveland, O., is marketing the E-Z rider shock absorber with slight improvements over the 1914 type. This is a Ford device and to prevent interference with the fender irons, the case now is being made in telescopic form, as shown in the illustration herewith. The top of the case works up and down over the lower portion. The feature of a ball and socket joint support is retained, but the small ball bearing now is packed with felt washers, which retain lubricating oil. The price is $15 per set of four.

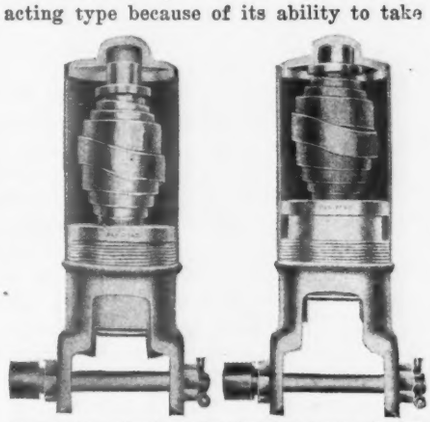


The O. M. C. shock absorber, showing the interior construction

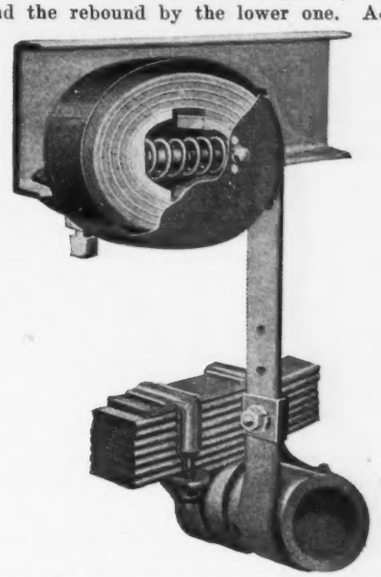
Comfort—A double-spiral spring type of shock absorber is marketed by the Comfort Shock Absorber Co., Hempstead, L. I., under the name of Comfort. This device is designed for Ford cars and contains within its single cylinder two springs, one within the other, and designed so that one spring takes the light shocks and both the heavy ones. The price is $5 per set of four.

Halladay—L. P. Halladay Co., Streator, Ill., is marketing the Halladay-Ford absorber at $12 per set of four. This is a single-cylinder, which takes the place of the spring shackle. Within the cylinder is a coil spring, and running through the center is a stout bolt fastened at the top by a plate. Under load, the absorber spring is compressed. Adjustment is provided by a nut at the top of the bolt.

O. M. C.—A new type of Ford shock absorber called the O. M. C. is being marketed by A. J. Picard & Co., New York. It is referred to by the maker as a double-acting type because of its ability to take one spring and the upper one two, as shown in the sectional diagram herewith. The cap and a part of the upper portion telescopes over the remainder. It will be clear that the load and the downward stresses are taken by the two upper springs and the rebound by the lower one. Adjustment is provided by means of the castellated nut on the center bolt.



Rex shock absorber, showing the spring in normal position and when compressed

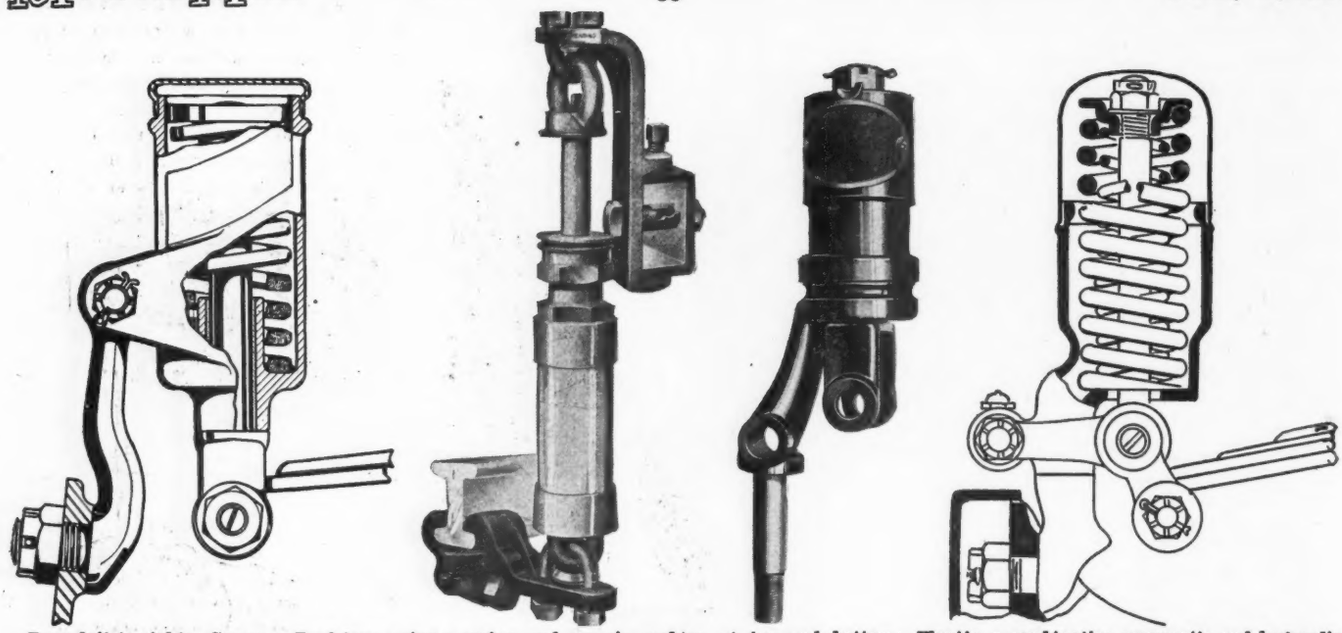


An odd type, the Gabriel Rebound Snubber, which is unchanged for this year

Hassler—This is an unusual type of shock absorber for Ford cars, which is being marketed in the same form as in 1914. The Hassler consists of an arm pivoted on the end of the car spring, the shorter end being fastened to the axle and the long one acting on an exposed spiral spring clamped to the axle, as shown in an illustration herewith. The price is $20 per set of four. It is made by R. H. Hassler, Indianapolis, Ind.

Johnson—The Triple Action Spring Co., maker of Johnson shock absorbers, is marketing these for 1915 without material changes over the 1914 type. The Johnson is a barrel-type absorber, using two intercoiled spiral springs and in the center of them a lighter spring. The outer spring is comparatively stiff and short, while the inner one is of small diameter and more resilient. The inner spring takes the light shocks and assists in subduing the rebound, while the heavy shocks are taken by the two intercoiled stiff springs. The illustration herewith shows the interior construction of the Johnson and also shows the outer casing, which is said to be dust and moisture-proof. At the bottom of the casing is an adjusting nut. Different sizes are made ranging from those of low weight to those of the heaviest type. Prices range from $22.50 per set of two to the heavy type, which lists at $40.

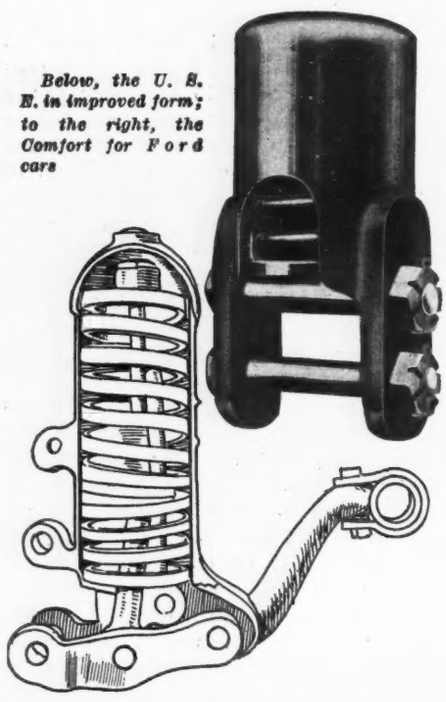
Connecticut—Another scissors type absorber is the Connecticut, which is marketed by the Connecticut Shock Absorber



From left to right: Gemco, a Ford type, using a spring and an air cushion at top and bottom; Flentje, a combination pneumatic and hydraulic device; E-Z-Rider, which now is made in telescoping form, the top of the case working up and down over the lower portion; Temco, a single-barrel type for Ford cars

Co., Meriden, Conn., unchanged for this year. This type depends for its action upon friction and in the Connecticut a three-faced cam bears against three flat springs, as shown in the illustration herewith. Movement of the arms of the shock absorber produce cam movement, which in turn causes pressure against the three springs and hence there is a reduction of shock. The action of the cam is progressive, so that the resistance offered is in proportion to the extent of the shock delivered. In order to prevent wear of the working parts an anti-friction leaf is inserted between the cam and the steel springs.

All the interior parts are packed with grease or a graphite compound. The standard models sell for $40 without fittings, and the light construction for $20 without fittings, the prices being for a set of four.



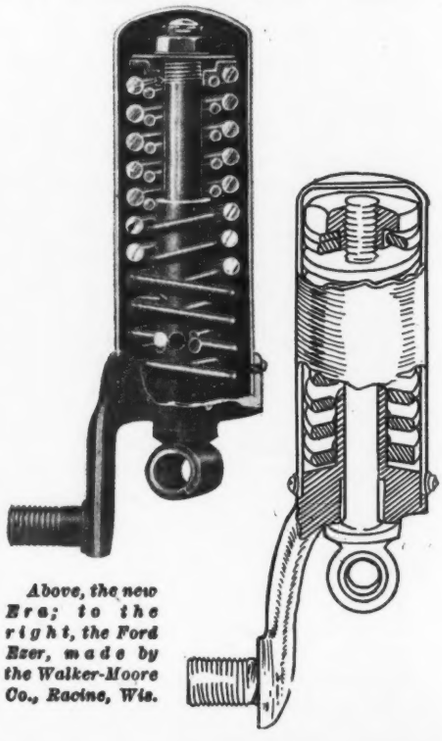
Below, the U. S. E. in improved form; to the right, the Comfort for Ford cars

New York—A new type of shock absorber for Ford cars is the 1915 leader of the line of such devices manufactured by the New York Coil Co., New York. This new absorber takes the place of a spring shackle regularly fitted to the car, the substitution of one for the other requiring little time and no disturbing of parts, such as wheels, axles, etc. It is not necessary to use a lifting jack for installation, a block of wood being inserted between spring and axle to allow of removing the shackle.

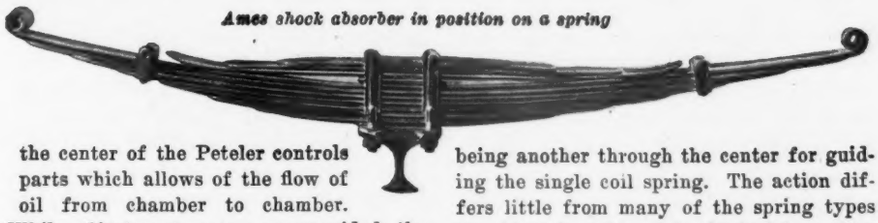
In action the absorber springs come into play first and after being compressed a certain amount the regular Ford springs come into action. The price is $7 per set of four. The New York is illustrated herewith.

Martin—This shock absorber is being marketed for 1915 with no changes over the previous model. The Martin is of the scissors type and depends for its shock absorbing qualities upon the expansion of three shoes against a drum or ring. This type is attached to the car, as shown in the illustration herewith, and on the downward movement of the vehicle spring no resistance is offered by the absorber. On the rebound, however, the arm of the Martin is drawn upward, this action causing a leather-faced friction ring to revolve slightly, and forcing the shoes in contact with it. Provision is made for adjustment caused by wear of the friction surfaces. Three sizes are made and they follow with their prices: For Ford cars, $35 per set of four; for cars weighing under 2,800 pounds, $40 per set of four, and for cars weighing over 2,800 pounds, $50 per set. Martin absorbers are made by the Martin Shock Absorber Corp., Los Angeles, Cal.

Peteler—The Peteler hydraulic shock absorber, made by the Peteler Shock Absorber Corp., New York, is offered for 1915 with practically no changes over the previous model. The Peteler appears like a scissors type of absorber and uses oil as the working media, this oil controlling the movement of a paddle wheel turning in a cylindrical housing. This housing is attached to the frame of the car by means of an arm, and another arm is fastened at one end to the paddle and at the other to the spring center or axle of the car. The paddle wheel causes four chambers to be formed in the casing and any movement of the paddle, due to arm movement, caused by a transfer of shock, will create a comparatively high oil pressure in two chambers and low pressure in the opposite two. A spring-backed piston located in



Above, the new Ezer; to the right, the Ford Ezer, made by the Walker-Moore Co., Racine, Wis.



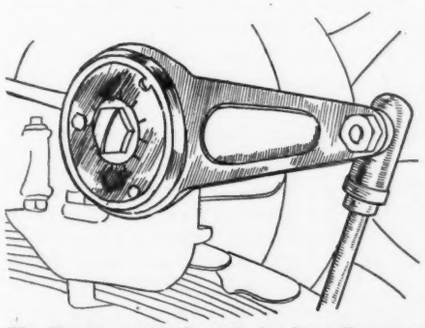
Ames shock absorber in position on a spring

the center of the Peteler controls parts which allows of the flow of oil from chamber to chamber. While adjustment means are provided, the wear on the parts is very small because all work in oil. The price is $70 per set of four.

Westinghouse — This pneumatic-type shock absorber is being marketed by the Westinghouse Air Spring Co., Pittsburgh, Pa., in the same form as previously. It consists of an air chamber made up of two sections, one of which telescopes over the other. The outer section is attached to a bracket on the frame of the car, and the inner section is attached to one end of one of the springs.

The chamber is partly filled with oil. The filling-plug is fitted with an air valve through which the chamber may be charged with air at any pressure, by means of an ordinary tire pump. The oil in the chamber seals the packings of the telescoping joint and prevents the air from leaking out. The mechanism inside the chamber is a small oil pump which is worked automatically by the up and down flow of oil past a flat piston whenever the air spring is compressed or extended. The oil passage surrounding the piston is restricted in order to retard the quick reaction of the spring.

Rex—This is a type brought out a year ago by the Volute Spring Shock Absorber Co., Mt. Vernon, N. Y., and its action depends upon a special form of spring called a double volute, which automatically adjusts itself to varying loads. The spring, which really is a true spiral type, is housed

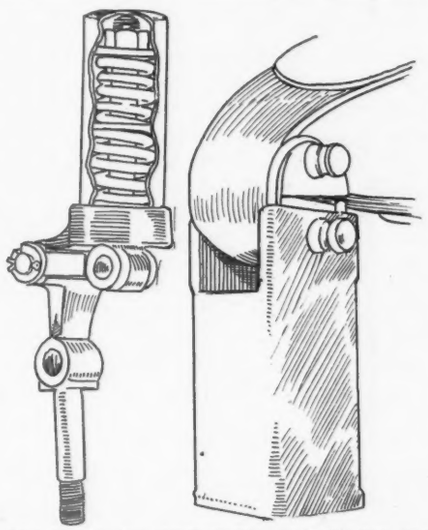


The Martin, which depends for its action upon the expansion of three shoes against a drum

in a cylinder, the upper portion of which is an air chamber containing a piston, to which the spring is attached. On the rebound of the car the air in the chamber is compressed by the piston and this, in connection with the spring action kills the road shocks, it is claimed. The Rex is shown herewith and the price is $25 for cars weighing up to 3,200 pounds.

U. S.—This is another barrel type, the cylinder being square, instead of round section. Each corner has a bolt, there being another through the center for guiding the single coil spring. The action differs little from many of the spring types in which the rebound is checked by spring compression. The price is $16 per set of four, or $11 for the Ford type. The maker is the B. & L. Lamp Co., New York.

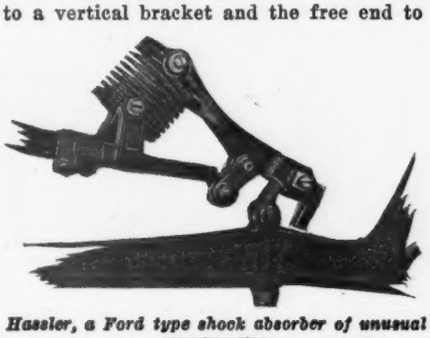
Flentje—The Flentje, a shock absorber made by Ernest Flentje, Cambridge, Mass., is a combination pneumatic and hydraulic device, and for 1915 has been improved by the use of better metals in some of the parts. The Flentje is essentially a cylinder within which operates a piston in a reservoir of oil. Above the oil reservoir is an air chamber. The piston incorporates a number of valves which on the rebound of



The Duplex for Fords is shown at the left and the U. S. at the right

the car allows oil to run from below to above the piston. Upward movement of the piston causes compression of the oil and release of compression on the oil below the piston. It is the retarding movement imparted to the piston by the oil which makes the Flentje efficient. The 1915 Flentje is shown herewith.

B. & R.—The B. & R. Shock Absorber Co., Philadelphia, uses a flat coil spring as a shock absorber for Ford cars. The spring has six convolutions and appears like a clock spring. Its center is attached to a vertical bracket and the free end to



Hassler, a Ford type shock absorber of unusual construction

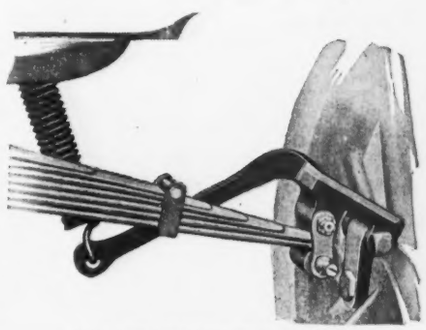
The Hoover when free and when under load

a lug, these taking the place of the regular Ford fixtures. The price is $15 per pair.

U. S. E.—A new model has been brought out by the Universal Stock Eliminator Co., New York, in which the coil spring, which is unusually long and large, is inclosed in a vertical casing designed to be mounted at the front end of the leaf spring. The device has a peculiar action, due to the fact that the amplitude of spring motion is increased by a lever which forms the connection with the lower leaf spring, so that it is doubled when it reaches the coil spring—that is, the movement of ¼ inch at the leaf spring produces a movement of ½ inch of the coil spring.

Twin-Koil—This is a new Ford shock absorber recently announced by the American Car & Ship Hardware Mfg. Co., New Castle, Pa. Its name, Twin-Koil, is given it because it contains two coil springs placed side by side in one cylinder. The springs are held securely within the cylinder so that there is no movement sideways of the springs in relation to cylinder. The cylinder is air-tight and dustproof, it is stated. The price is $15 for four.

Anderson—The Anderson Spring Co., Detroit, Minn., is continuing its leaf-type shock absorber unaltered. The Anderson consists of four spring leaves connected at the center and gradually separating toward the end. The ends of the top leaves have an eye and to this is attached a metal clip which passes under the spring. When the car



A new Ford type called the H & D

hits a rut and travels downward the spring engages the clip and thereby takes hold of the upper leaf of the absorber.

Hoover—The Hoover is one of the simpler types of shock absorbers and is manufactured by the Hoover Spring Co., San Francisco, Cal. It is nothing more than a small three-leaf spring placed underneath the regular spring. In this type the car springs are prevented from flattening too much and the shock is taken up by the transfer of it between the

Hoover and the regular spring. Prices range from $14 per set of four 1½-inch to $18 for the 2½-inch.

Compound—This is another example of a Ford type using two springs placed one above the other with a metal separator between them. The bottom spring is designed to take the light and medium shocks and the upper one the heavy loads. Eight dollars for four is the price asked.

Fordezer—This is a Ford type using a single cylinder, mounted in the conventional fashion. It sells for $12 per set of four and is marketed by the Fulton-McCutchan Co., Chicago, and built by the Walker-Moore Co., Racine, Wis.

Comfort Hydraulic—This device consists of a piston operating in a cylinder filled with glycerine. It is specially adapted to Ford and is shown herewith so installed. The price is $12 per pair.

Duplex—So called by its maker, the Peerless Motor Specialty Co., New York, because it is fitted with two springs, one above the other. This type takes the rebound as well as reducing downward jolts. It is designed for Ford cars and sells for $10 per set of four.

H. & D.—This is an odd type of Ford shock absorber using a rather long coil spring, as shown in the illustration herewith, the end of which connects by leverage to the spring shackles. Any movement of the car springs causes movement of the lever and hence the auxiliary coil spring comes into play. It is made by the H. & D. Co., Goodland, Ind.

Apco—The Auto Parts Co., Providence, is marketing this shock absorber, which is designed for Ford cars. It comprises a cylindrical metal shell and springs of square section. Sidesway is prevented by cantilever side arms. The Apco does not interfere with the fender irons. The price is $15 for four.

Stone—The Universal Rim Co., Chicago, a patents-holding company, has entered the shock absorber field as the maker of the Stone, a Ford type consisting of a coil mounted in a partly-closed cylinder, the spring taking up both movements of the car springs. The price is $4.50 per set of four.

None-Such—This is made by the Brown Co., of Syracuse, N. Y., and is of the barrel type. It is made especially for Ford and Maxwell cars. The price is $10 per set of four for the Ford cars.

F. F.—This is another Ford type using a square-section coil spring mounted in a cylindrical casing. It is made by the French Mfg. Co., Cleveland, O., and sells for $15 per set of four.

Landis—The Landis, made by the Landis Engineering & Mfg. Co., Waynesboro, Pa., is a combination pneumatic-hydraulic type brought out over a year ago. No changes have been made for 1915. The Landis consists of a casing two-thirds filled with oil, a movable cylinder with a piston, the latter acting as a valve. The piston actuating arm clamps to the frame and the outer casing to the lower spring. When the car springs are compressed the valves in the Landis are wide open, thus allowing free movement, but on the rebound to flow is retarded.

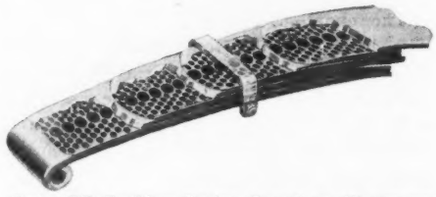
Right—The Right is a new absorber made by the Right Motor Specialties Co., Chicago, Ill. It is of the auxiliary spring twin type and is made for cars weighing up to 3,500 pounds. The coil springs are of flat stock alloy steel, of ample diameter and length, giving a resilient movement of 2 inches. The cylindrical cases of steel tubing are pressed into the sliding blocks and held there by the pressure of the coil springs. The price is $15 per set of four.

Fowler—Ford Flexo springs is the name given the shock absorber made by the Fowler Lamp & Mfg. Co., Chicago. The Flexo spring is a simpler type, resembling in appearance a pretzel. It takes the place of the Ford shackle. Price, $6 per set of four.

Naco—The National Applicance Co., Grinnell, Ia., is marketing shock absorbers in three sizes for cars weighing up to 4,000 pounds and also special spring shackle links for Ford cars. The latter act as auxiliary springs and sell for $8 per set of four. The regular Naco absorber is in the form of a long cylindrical casing within which a piston with a cone-shaped head operates against wedges, the spreading or wedge action taking up the shock. For cars under 2,400 pounds the price is $30 per set of four.

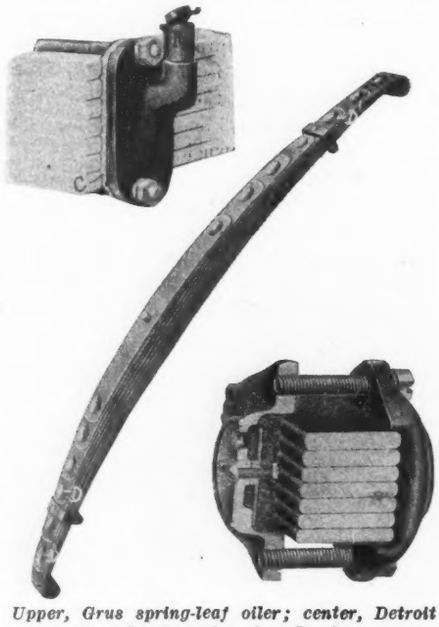
Springs and Spring-Leaf Oiling Devices

DANN Oil-Cushion Springs—The Dann Oil Cushion Spring Insert Co., Chicago, is featuring the Dann Insert Equipt Springs, which are built with the company's oil-cushion inserts already installed. The necessary strength to carry the load properly, silence of action, ability to absorb shocks and eliminate mechanism-destroying vibration are among the numerous excellences claimed for this spring. Among the cars for which have been adopted the Dann inserts as standard equipment is the Winton, Borland electric and Standard truck, of Warren, O. The Dann insert insures constant lubrication between the leaves of the spring, thus adding materially to its life.



Dann Oil Cushion Spring Insert as it appears in a spring

Tuthill Titantic Spring—In actual practice it has been demonstrated that 75 per cent of spring breakages occur in the center, and it was in the light of this knowledge that the Tuthill Spring Co., Chicago, perfected its Titantic Unbreakable model, which is reinforced where the strain is most likely to occur, in the center. The company agrees to replace, free of charge, every spring that gives way at the point mentioned, and incidentally it may be mentioned that it is seldom necessary to take advantage of the guarantee.



Upper, Grus spring-leaf oiler; center, Detroit spring, showing oil pocket, D; bottom, Brown oil box

Grus Spring Leaf Oiler—William Grus, Jr. & Co. is marketing a spring leaf oiler which is designed to feed oil continually between the leaves of the spring. The device is clamped to the spring as shown and between the metal and the leaves is a leather washer, C. The oil is placed into the retainer R and from here it works its way to the washer which feeds the leaves, it is stated.

Brown Oil-Box—To insure constant flexibility in a spring some means should be taken to secure inter-leaf lubrication. The Brown Oil-Box, manufactured by the Brown Trafilog Co., Cleveland, O., is a neat and compact device which is offered for this purpose. These boxes are attached to the springs in such manner that there is a constant flow of oil between the leaves, thus eliminating the formation of rust and the squeaks which are so annoying to the motorist.

Detroit Springs—The Detroit Steel Products Co., Detroit, is the maker of a design of spring which is styled a self-lubricating type. The feature is the cup-like depression stamped in either end of every leaf of the spring. These cups are filled with a heavy, non-fluid lubricant, having the property of long life. The lubricant is spread over the entire friction area by the action of the spring in service, it is said. A natural slight concavity of the spring leaves themselves provides an easy channel for the lubrication of all parts.

HAND-OPERATED signals seem to have the call this year as a feature of development. Practically every manufacturer of horns of whatsoever type has come out within the past 12 months with some sort of horn which may be operated by the hand directly, instead of by an electric current or by air, as in the old bulb type. In fact the bulb horn has almost disappeared from the accessory market, giving way to the more penetrating and almost as inexpensive mechanical-diphragm type. Some very novel arrangements have appeared in answer to the demand for this newer type.

The Klaxon Line for 1915—Klaxon warning signals which are manufactured by the Lovell-McConnell Mfg. Co., Newark, N. J., are being produced in types suitable for every size car on the market. The Klaxon may be had in three types. The Klaxonette also in three types; the Klaxette in a single type and a hand Klaxon in two types. Prices range from $30 for the combination Klaxon down to $7.50 for the two types of hand Klaxon, one of which is specially designed for commercial work. The principle of the Klaxon is too well understood to need description.

Stewart Warning Signal—The Stewart-Warner Speedometer Corp., Chicago, manufacture but one type of warning signal, a hand-operated device that may be adapted for use either on pleasure cars or on trucks. The drive is of the ratchet type, the plunger having a long bearing which prevents wabbling. The projector is made of brass. A doubly-supported bracket forms a solid base for the horn, so that no amount of pressure can wrench it from its place. This bracket is also made with a swivel joint, so that regardless of the direction of the top rail of the car the signal always points in the direction in which the car is moving. This signal retails at $5.

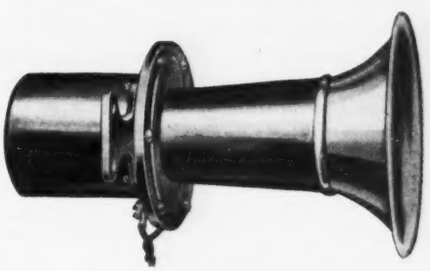
Sparton Warning Signals—Four types of electrically operated horns and two hand-operated signals comprise the line of the Sparks-Withington Co., Jackson, Mich., for 1915. The electric signals are so constructed that the tone can be modulated or increased to suit the occasion, but at all times the tone is perfect and positive and commands instant attention. Model D is listed at $15; model U at $14; model B at $9 and model J at $8. The two models of Sparton hand-operated horns give a warning sound which is almost a duplicate of that emitted by the electric types, and may be operated either by the hand, elbow, knee or foot. Model E-B retails at $5 and model E-J at $4.25. One of these is shown in an accompanying illustration.

Newtone Warning Signals—Four styles of warning signals, embracing three different mechanical principles, enable the Automobile Supply Mfg. Co., Brooklyn, N. Y., to meet the various conditions and requirements of motor car use. The two types of electric motor-driven horns—the large model at $10 and the Superior at $8—produce a volume of sound that seems out of all proportion to their size, and at a minimum current consumption. The Apollo vibrator horn, at $3.50, and the Handphone, at $6, complete the line. The latter is supplied with two styles of brackets, one for the Ford.

Typhoon Electric Signals—The Typhoon Signal Co., Lincoln, Ill., has announced its new type F electric horn, which comes either with a 6-inch projector for use on the outside of the car, or in the concealed style with extra-long projector for use under the hood. Both types are listed at $4. Short-circuiting is prevented by using flexible tubular connections for the wiring to the horn. Choice of two styles of finish is offered—all black enamel and black enamel and nickel.

Ka-Ha-Co Electric Vibrator Horn—The Kales-Haskel Co., Detroit, Mich., is manufacturing an electric vibrator horn, the Ka-Ha-Co, which retails at $5, complete with wire cable and push-button. It is operated by a 6-volt storage battery or four dry cells. It is simple, neat and foolproof and is finished in all black, black and brass, or black and nickel.

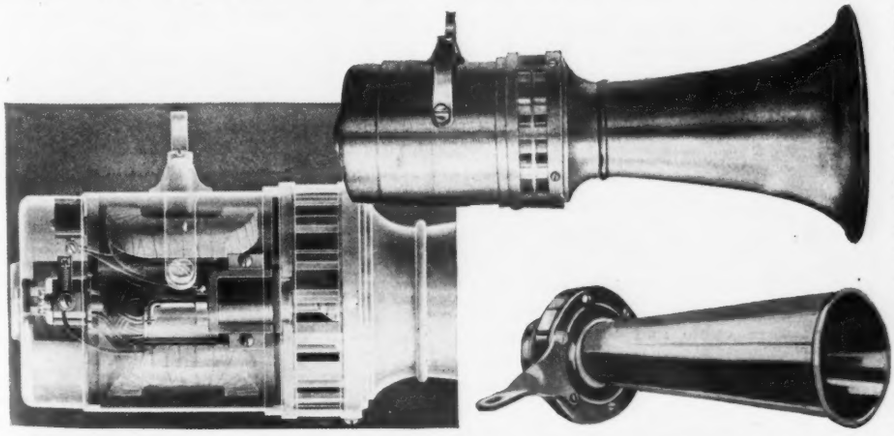
Clero Warning Signals—The Fitzgerald Mfg. Co., Torrington, Conn., is featuring two types of mechanical warning signals—



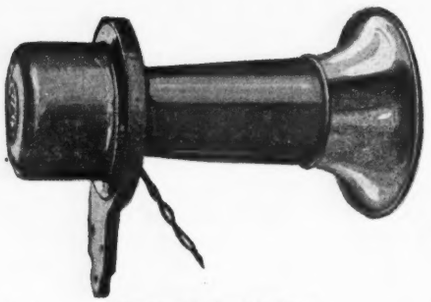
Klaxet electric signal

model F, with short bell, at $4.50, and model A, with long bell, at $5. The former is designed especially for cars of the Ford type. The company is also making the Clero Junior and the Clero Bulldog, two types of hammer-blow horns which are meeting with much favor. In these latter models an ordinary electro-magnet operates an armature on the make-and-break principle. The armature carries a hammer which works with tremendous speed against a 5-inch steel diaphragm operating on four or six dry cells or a 6-volt storage battery.

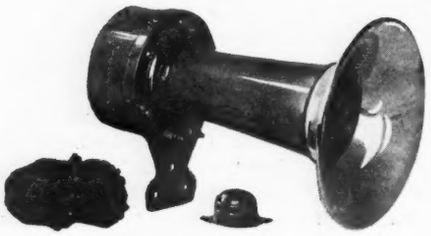
Nonpareil Electric Horns—The Nonpareil Horn Mfg. Co., New York, is manufacturing a comprehensive line of motor-driven, vibrator and mechanical horns which have many points of merit. The Nonpareil Big Noise, a motor-driven device, is equipped with a compact, powerful motor. Steel hardened disks on the armature serve as a striker to the diaphragm, producing a penetrating warning signal. These disks may be adjusted to produce either a sharp or mild tone by loosening the two top screws which fasten the motor to the base plate. The Nonpareil Big Noise is listed at $12.



At left, phantom view of Sireno; above, Sireno electric horn; below, at right, Benjamin signal



Nonpareil electric horn



Garford electric

The Nonpareil vibrator horn retails at $5. The Pilot hand-operated horn, which is also made by this company, and which may be placed under the hood if desired, is quoted at $10 complete. Other models of hand-operated horns are designed to be placed on the fore door or steering post, these latter retailing at $6.

Safeguard and Duplex Horns—The Duplex Electric Mfg. Co., Pittsburgh, Pa., announces three types of warning signals as its line for 1915. These consist of the Safeguard electric motor-driven horn; the Hand Safeguard, a mechanical signal, and the Duplex electric vibrator horn. There are three separate models of the Safeguard motor-driven horn—Model A, 12-inch, at $10.50; Model B, 9-inch, at $9, and Model F, 7-inch, at $7. The latter is designed especially for use on Ford cars. The Hand Safeguard is listed at $5 and the Duplex vibrator horn at $4.

New Era Warning Signals—The New Era Spring and Specialty Co., Detroit, Mich., is featuring for 1915 its motor-driven horn at $6.00 and a hand operated signal at $5.00. Among the advantages claimed for the New Era product are simple construction, few parts, and minimum current consumption. The diaphrams are made of vanadium steel and the parts subject to wear of glass-hardened tool steel. The hand-operated New Era signal has the basic patented principle flying momentum to produce a longer series of sound.

Standard Electric Horn—The Standard Metal Manufacturing Co., Newark, N. J., is manufacturing a buzzer type electric horn in several models, to meet the requirements of various types of cars. Five separate models are included in the company's 1915 line. Model 804 is an under-the-hood-type and is equipped with a 4-inch projector. Its small size permits of its being disposed of to advantage in cars of even the smallest size. Models 805 and 826 are designed for use on the outside of the car.

Heco hand horn

Samson Electric Horn—The American Electric Co., Chicago, manufactures the Samson line of horns in motor-driven, vibrator and hand-operated types. The motor-driven models are listed under the names Samson motor horn, Samson-Junior motor horn, and Samson-Lion. The vibrator horns under Samson-vibrator horn and Victor horn; the hand-operated horn under the title Samson-Tiger. The Lion and Tiger models are the new addition for 1915. The latter, a hand-operated signal is so arranged that it can be placed outside of the car with the operating handle on the inside, thus rendering it suitable for use in closed car models.

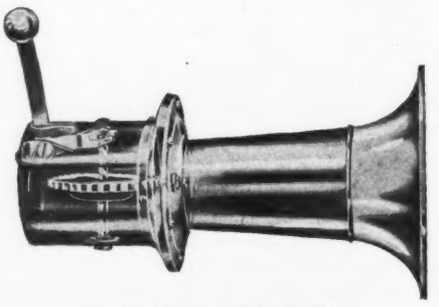
Sireno Electric Warning Signals—The Sireno Co., New York, manufactures three models of Sireno horns—The Sireno, with long or short projector optional, at $35.00, the Sireno-Junior, with similar options at $25.00 and the Sireno Midget at $18.00. The two latter are similar in construction to the larger model, with the exception that they do not have the magnetic breaking device. The Sireno gives excellent results when used in connection with the regular 6-volt ignition, starting or lighting storage batteries, it is stated by the company.

Reacto Electric Horns—The Holtzer-Cabot Electric Co., Brookline, Mass., which makes the Reacto electric horns has made no changes in its product for 1915. The Reacto horn is of the simple hammer-blow type, the heavy armature striking the diaphram squarely and rebounding so quickly that the vibration is in no way damped or retarted. The price remains unchanged, $10 to $12 depending on voltage.

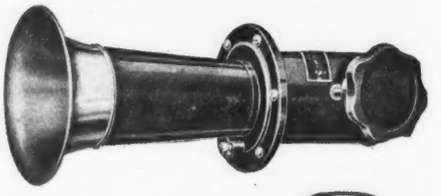
Russell Electric Signals—The Russell Electric Co., Danbury, Conn., announces for 1915 its line of Russell-Hammer horns and Saxon-Auto horns. In the former a central force, iron-clad magnet attracts rapidly and with great force a heavy round hammer head which in turn strikes directly on the center of the steel diaphragm producing a deep and powerful tone. The hammer horn can be attached to either side of a car and is listed with complete outfit at $10. Saxon outfits comprise horn, bracket, push-button, wire, cable and terminal connectors. Model A. is listed at $10, Model D., $12. Saxonette, Model B., $7.50; Model A., $15; Saxon Junior, Model F., $6.

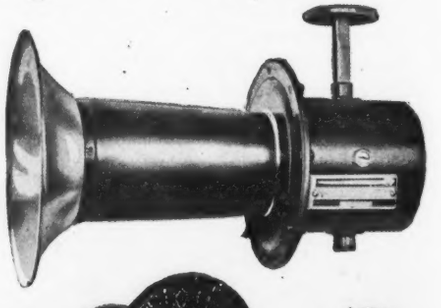
Benjamin Horns—The Benjamin Electric Mfg. Co., Chicago, announces four models of electric warning signals for 1915. These devices leave the factory under a 5-year guarantee with exchange privilege in case of defective operation. Among the determining mechanical features of Benjamin horns are the laminated magnet, massive contacts, shallow movement case, lightweight, Swedish steel spring diaphram with cork felt washers. Model D. is listed at $4; Model E., $6; Model F., $6 and Model J. and under-the-hood type, $5. For Ford cars the company has recently put on the market the Fordorn, which is operated direct from the Ford magneto current, no battery being needed. The Fordorn is made in two models, A., dashboard type, at $6, and Model B., under-hood type, at $5. The company is also featuring the Benjamin Dad steering wheel push-button for electric horns.

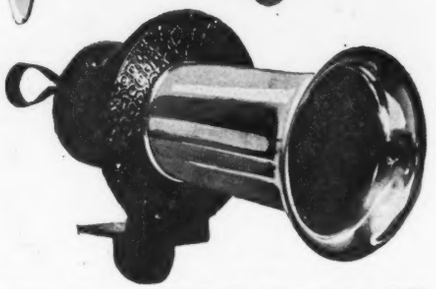
A.-B. Trumpet Electric Horns—The Adams-Bagnall Electric Co., Cleveland, O., manufactures two distinct types of trumpet electric horns, two models of it are motor-driven and the third is of the single-coil vibrator type. There has been few changes in the motor-driven trumpet since last



Sparton hand horn in phantom







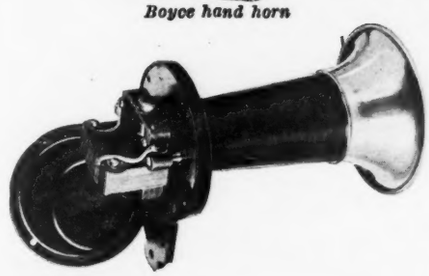
Above, Samson; middle, New Era; below, Talking horn

year, apart from the added refinement suggested by the company's experience. One feature of the A.-B. trumpet which deserves attention is the ease with which the mechanism may be exposed for inspection, all that is required being the removal of two screws. The armature can be inspected and the commutator sand-papered while running. The single-coil vibrator horn requires no adjustment owing to the accuracy with which the parts are manufactured and the flexibility of the compact carrying parts. This horn consumes from ½ to 2 amperes on 6 volts.

Hand-O-Horn—This mechanically operated warning signal, which is made by the Superior Lamp Mfg. Co., New York, has a vertically mounted plunger, pressure upon which rotates a striker against a diaphragm, producing a sharp tone which has a distinctly alarming quality. The Hand-O-Horn is trimmed in black and brass and retails at $6.

The Over-Tone Horn—A new mechanically operated horn has been placed on the market by the Overholt Co., Galesburg, Ill. It is known as the Over-Tone and is of an entirely new model and design. It is a signal of varying intensity, according to the exigency of the situation. It is easily attached to any car, on the dash, side or under the hood, and the operating cord can be arranged to suit the location. The horn is 8x4½ inches, and is listed at $3.50.

Boyce hand horn



Above, Adams-Bagnall electric; below, Duplex hand horn

The Long Horn—This hand-actuated warning signal, in three models, is marketed by the H. W. Johns-Manville Co., New York city. The projector is of one piece, without seam, and the vibrator runs on a ball bearing. By varying the pressure on the plunger the tone can be made either mild or sharp. Model F is designed for Ford cars, while models S and JS are for larger cars.

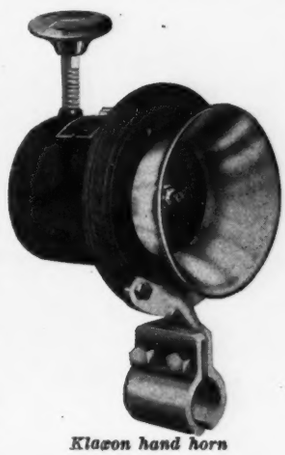
Heco Mechanical Auto-Horn—The Heinze Electric Co., Lowell, Mass., is marketing the Heco mechanical horn, the feature of which is a spiral handle which when pressed down engages a ratchet clutch, turning the rotor, which is made of steel hammers that fly out by centrifugal force and whirl against a steel diaphragm. The sound produced has a warning quality which is very effective. The Heco is listed at $4.

The Double Warning—A new type of mechanical warning signal is the Double Warning, which is manufactured by the Talking Horn Co., Inc., Middletown, N. Y. It is made in two sizes, retailing at $5 and $6.50. This signal is operated by pulling a strap, which is automatically drawn into the case upon being released, repeating the warning with a louder effect. With an additional leather cord, attached to the strap, this signal can be attached to any part of the car and may be operated by any one, driver or passenger.

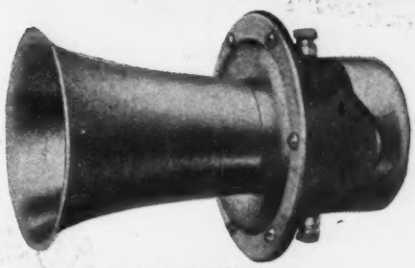
Beartone Combination Fan and Horn—A new type of horn called the Beartone has been placed on the market by the Oakes Co., Indianapolis, Ind., the instrument being an integral part of the cooling fan assembly. The rotation of the fan operates the horn, the control being in the form of a button by which it is possible to obtain either a loud or soft sound. The metal diaphragm is fastened to the central portion of the fan assembly and rotates with it. Inside the fan support a stationary member causes the diaphragm to vibrate when it is brought in contact with the latter. A small lever at the back of the fan bracket operates the stationary member.

Marvel Ford Fan-Horn—This mechanical diaphragm horn is operated upon a principle somewhat similar to that described above, the old fan and bracket being removed and the Fan-Horn installed. The cable which operates the signal leads to a push button which is conveniently located. The volume of sound can be regulated to suit the occasion, a loud insistent note or a low gentle signal being possible at the will of the operator.

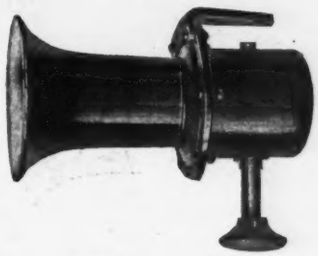
The Trinity Bell—This compound electric signal, which warns both the eye and the ear, is manufactured by the Trinity Bell Electric Mfg. Co., Chicago. Mounted on the front of the radiator—although it may be mounted anywhere on the car—pressure upon the operating button, placed convenient to the hand of the driver, not only produces a sharp warning upon the bell, but flashes a red light which cannot but be peculiarly effective at night. The Trinity Bell is made in three sizes—model A, for small cars, at $6; model B, for larger cars, at $10, and model C, for trucks and heavy pleasure cars, at $12.



Klaxon hand horn



Ka-Ha-Co electric signal

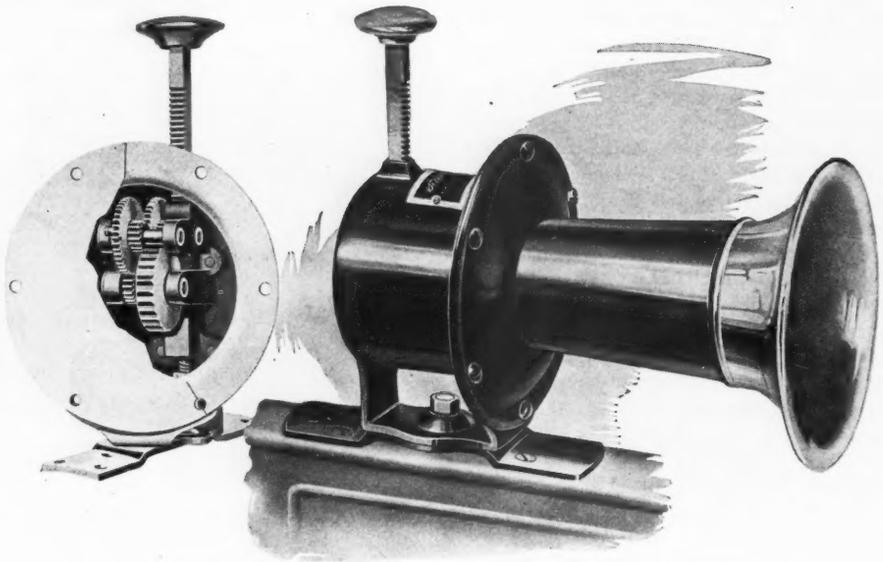


Long horn—a pioneer

The Liberty Bell—Another combination signal which appeals to both eye and ear is that manufactured by the Liberty Bell Co., Cleveland, O. The light, which is mounted above the bell, is equipped with an 8-volt tungsten bulb, and flashes a red signal whenever the bell is rung. The Liberty Bell is made in two sizes, and if the red light is not desired an eagle can be used in its place, the effect being decidedly ornamental. Operation of this signal is by a conveniently located push-button.

Handphone—The mechanism of the $6 hand horn shown by the Automobile Supply Mfg. Co., Inc., Brooklyn, N. Y., has been greatly improved, and at the same time the price has been reduced from $7.50 to $6. The plunger bar which formerly had the rack attached, as a separate piece, now is made in one piece with integral teeth. Instead of projecting through the bottom of the case, and having the spring at the top, the bar has been shortened so that it does not project and the spring has been placed at the bottom and part of it extends into the bar. This decreases the number of parts used and results in more satisfactory operation.

Service Motor Supply Co.—This Chicago company has recently put upon the market a hand-operated horn simple in construction and handsome in design. The company guarantees it for 3 years. This horn



Interior and exterior of Stewart hand horn showing speed gears

is being made in two sizes—the smaller being listed at $3.50 and the larger at $3.75.

Garford Chain-Driven Horn—Gears have been eliminated in favor of chain and sprockets in the new horn shown by the Garford Mfg. Co., Elyria, O., and selling for $4.25. The construction is simple in the extreme, the rack bar operating a shaft carrying the large sprocket, and the small sprocket being mounted on the shaft carrying the toothed rotor, which causes the diaphragm to vibrate. The company also makes three types of electric horns—Rexo II at $3.85 and Rexo IV at the same price; the Garford at $8 is handsomely finished and is a distinct embellishment to any car. The tone is unusually loud, clear and positive, while the construction is such that it is claimed that it will outlast all other signals. The operating button is so constructed as to insure contact at all times.

Boyce Hand Horn—A mechanical horn which is operated by a twist of the wrist has been brought out by the Boyce Co., New York. The sound is produced by revolving the casing over the rear end. A movement of 1 inch in either direction is sufficient to produce the warning note. It is stated that the casing turns with very little effort. The device is finished in black and nickel and sells for $6.

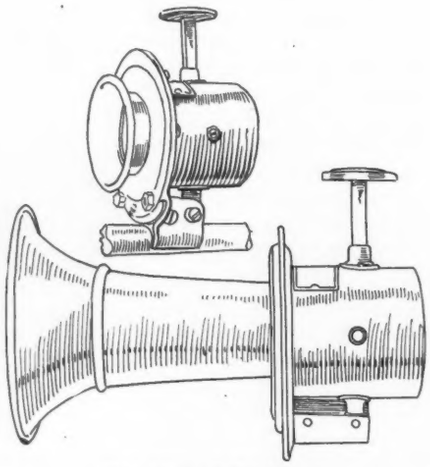
EXHAUST HORNS

The Autochime—The Gray Hawley Mfg. Co., Detroit, Mich., manufactures several types of exhaust horn known as the Autochime. This is made to attach to the muffler pipe and exhaust pressure causes it to give out a powerful musical tone. It is furnished with fittings for attachment and an operating pedal.

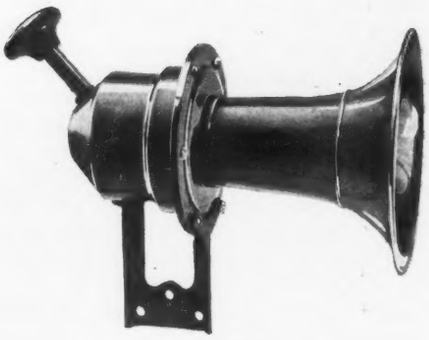
Fogg and Blazer Horns—The Motor Specialties Co., Waltham, Mass., is manufacturing two styles of exhaust-operated horns—the Fogg and the Blazer. Each style is designed for cars of the Ford type. The Fogg is claimed to be an improvement on other signals of the type in that it is attached ahead of the muffler, thus throwing the sound ahead instead of to the rear. The valve mechanism comprises a single-acting two-way valve. Another feature claimed for this horn is that it will deliver a loud signal when the motor is running slow. The Blazer horn can be attached without cutting the exhaust pipe; it extends toward the front of the car and makes a clean-cut end to the exhaust pipe.

Gemco Exhaust Horns—These signals, which are operated by the exhaust, are manufactured by the Garage Equipment Co., Milwaukee, Wis. Its construction is very simple, consisting as it does of a one-piece aluminum casting. A very weak exhaust will produce a sound out of all proportion to the pressure. It is claimed for the Gemco horn that it cannot clog or rust.

Exhaust Horn—The Troy Auto Specialty Co., Troy, N. Y., manufactures the Exo horn, which is operated by the exhaust. The horn is fastened to the end of the exhaust pipe and is operated by means of cable and pedal. For cars of 30-horsepower and under the price is $5; for over 30-horsepower, $7.



Two types of Handphone

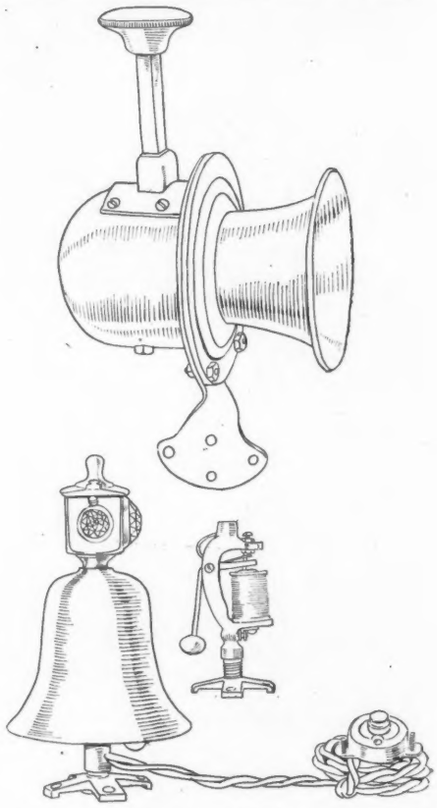


Garford hand horn

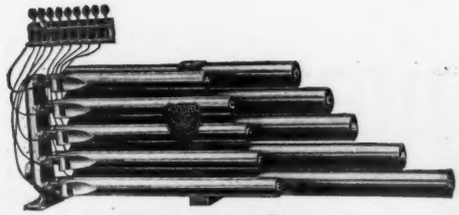
Apco Exhaust Whistle—The Auto Parts Co., Providence, R. I., is making the Apco exhaust whistle, one advantage of which is that it may be operated without the driver taking his hands from the steering wheel. The device weighs but 1 pound, is very simple and can be put on the car in half an hour. It is claimed for this signal that it cannot clog, as no part of the whistle comes in contact with the exhaust gases when the warning is sounded.

Barco Automobile Chimes—The Barco Brass & Joint Co., Chicago, which makes the Barco chimes, announces two styles for 1915. These chimes are attached to the exhaust pipe and operated by a conveniently located pedal. Three harmoniously blended tones form a chord which is quite pleasing to the ear. The strength of the signal can be modified as occasion demands. Its installation is very simple. No. 2 Barco has a higher pitch than No. 1, but is equally effective.

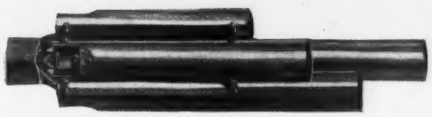
Gabriel Horns—Gabriel horns are manu-



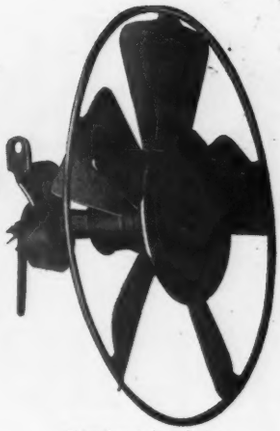
Above, Clero hand horn; below, exterior of Liberty Bell and its ringer



Gabriel exhaust chime

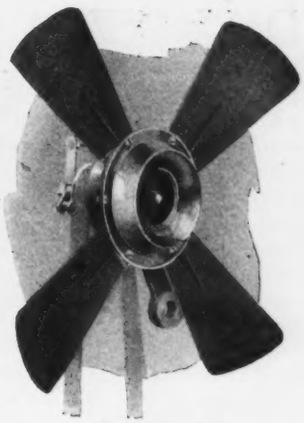


Aermore Exhaust chime



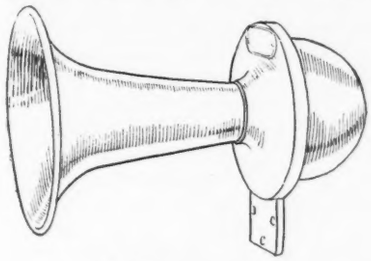
Beartone fan horn

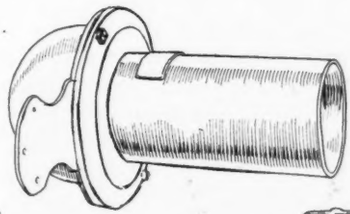
Trinity Bell

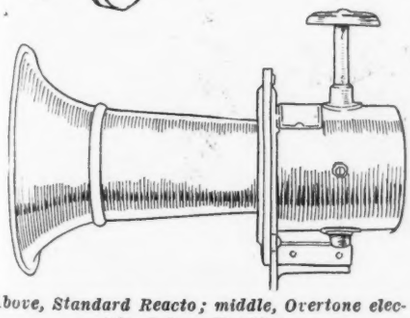


Marvel fan horn

factured by the Gabriel Horn Mfg. Co., Cleveland, O. The single-tube horn consists of a brass tube, the interior of which is divided into separate chambers, each producing a distinct note as the exhaust gases are directed through them. It is controlled by a pedal which leaves the driver's hands free. The trumpet horn comprises four notes, and is fitted with a keyboard which permits of sounding them separately or together. A simple locking device on the keyboard enables the operator to put the latter out of commission, and to sound the four notes in unison as a chord by pressure upon a pedal. The Musical Wonder horn, comprising ten brass tubes, each producing a perfect note, affords the operator a range which will enable him to play simple melodies. Each horn is lettered to correspond with the letters on the keys. Four separate chords of four notes each may be produced and controlled at the will of the operator by simply turning a small lever on the keyboard.







Above, Standard Reacto; middle, Overtone electric; below, Handfone

The latest product of the company has twelve tubes, there being seventeen keys on the control board.

Aermore Exhaust Horn—The Fulton Co., Milwaukee, Wis., makes this horn in three different sizes for motor cars, no change having been made in this respect for the past three years. Prices, however, have been reduced, No. 1 now being listed at $7.50; No. 2 at $6.50 and No. 3 at $5.50, the latter being intended for Fords and for cars of 20-30 horsepower. These prices include all the necessary equipment. The horn is attached to the exhaust pipe of the car by means of a special valve, the sound being produced by the pressure of the exhaust.

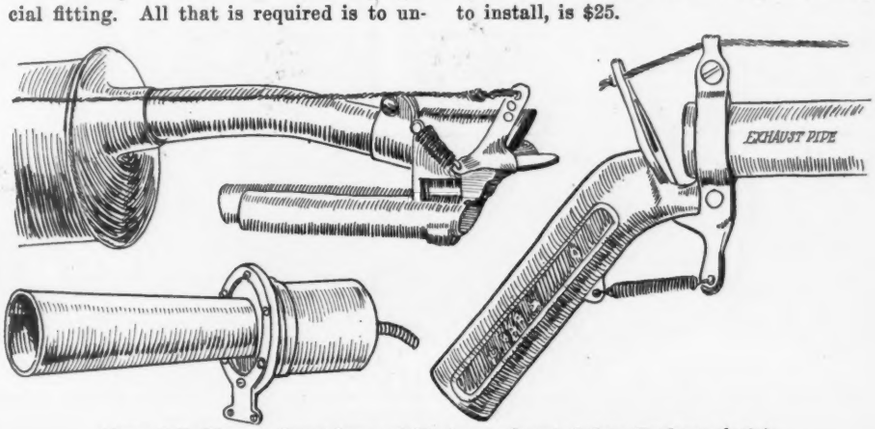
Jericho and Jubilee Horns—These horns, which are manufactured by the Randall-Faichney Co., Boston, Mass., are of the exhaust type, being operated by a pedal, thus giving the driver continued use of both hands at a time when perfect control of the car is necessary. The Jericho is a one-toned horn, the Jubliee being of the chime-tone type.

SOME UNUSUAL FITTINGS

Halladay Adjustable Steering Wheel—To allow easy movement of passengers in and out of the front seat of the Ford car the L. P. Halladay Co., Streator, Ill., has designed Ford steering wheel which may be swung up out of the way. It replaces the ordinary Ford wheel without any special fitting. All that is required is to unscrew the nut holding the old wheel and put the new one in place. It locks automatically and when locked is securely held, but the wheel may be released when desired with very little effort. The 14-inch spider alone sells for $3. The same spider with the rim for $4 and a 16-inch spider with rim $5. The Halladay company has also brought out a new Ford windshield ventilator. This allows the movement of the lower part of the windshield away from the dash so that a current of air will flow in to provide ventilation. The price per set is 75 cents.

Superior Streamline Hood—To give the Ford hood a more streamline appearance, the Superior Lamp Mfg. Co., New York, has brought out a sloping hood for Ford cars which sells for $11.40 complete. The change is easily made. The old hood rest is removed and a new one, which is part of the outfit, is put in its place. The new hood is then attached. This hood is provided with louvres and is finished in black enamel.

Alton Heater—An exhaust heater for providing warmth to the passengers has been developed by the Alton Sales Co., Station E, Cleveland, O. It consists of a radiator which is sunk in the floor of the car and a flexible steel hose, which taps the exhaust pipe in front of the muffler. There is a valve for controlling the amount of heat. This valve is situated at the muf fler pipe and is controlled by a lever at the side of the radiator. The price, ready to install, is $25.



Above, left, Blazer exhaust horn; right, Apco exhaust; below, Typhoon electric

Magnetos, Igniters and Ignition Supplies

DEVELOPMENT in the magneto field has rested this past year upon comparatively few makers, there being little more than twelve progressive ones represented, and these have made some distinctive advancement in their new products. The principal trend appears to be toward obtaining instruments which give a very hot spark at low engine speeds, this construction having been called for because of the greater number of six-cylinder motors, which may be throttled very low. Also where a magneto is used, it alone often is depended upon to furnish current, and hence one quick turn of the crank is required to furnish a sufficiently hot spark to start the motor. Waterproofing and dust-proofing have been carried to a fine point and many of the 1915 magnetos are of the covered type in which the separate magnets are not visible.

Three of the large makers have brought out new Ford instruments and the latest designs show these to be driven directly from the timing gears and not by chain, which type was used first.

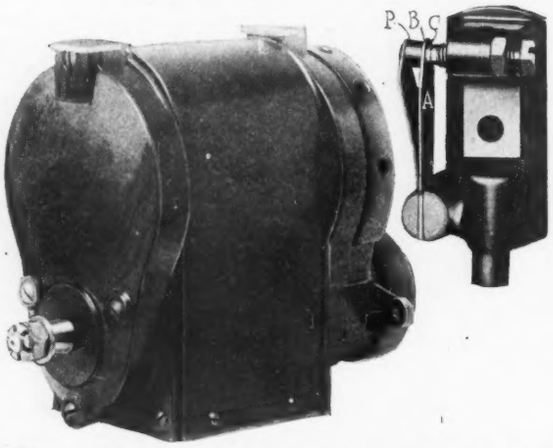
Bosch—The most important changes made in the line of ignition instruments of the Bosch Magneto Co. have been in the introduction during the past year of the new vibrating duplex system and the NU4 magneto for four-cylinder popular-price cars. Recently, the concern has added to its line a new attachment for driving the NU4 magneto from the Ford timing gears, this type superseding the chain-drive attachment placed on the market last year. Besides these new features the company carries a most extensive line of ignition instruments, including over 200 types. In the motor car list there are those for one, two, three, four, six and eight-cylinder motors and in single, dual, and two-point form.

The most-recent Bosch introduction, the Ford attachment, differs from the previous one in that it employs gears as the driving means and instead of using the DU4 magneto, the new NU4 is used. The price is $10 lower than the former one, making it $48 for the complete outfit, which is shown in an illustration herewith. The new attachment consists of an aluminum cover plate for three gears, the proper gaskets, wires, bolts, nuts, washers, etc.

In the new NU4 instrument, by the elimination of the distributer as an independent unit of the magneto construction, it has become possible to reduce materially the number of parts used in the manufacture of the magneto, making it exceedingly light.

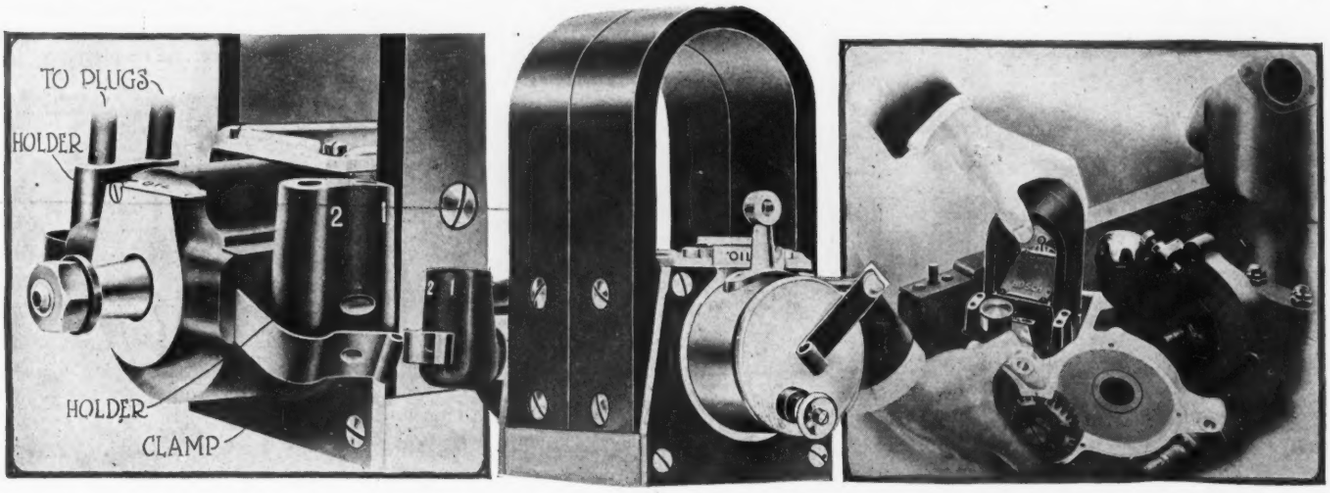
The function of distributing the ignition current has been placed in the new instrument on the slipring. The single slipring, however, has been replaced and instead a double ring has been substituted, which not only acts as the collector for the high-tension current, but as the distributer as well.

The new Bosch vibrating duplex system is an improved type over the former duplex. The vibrating system is designed to render unnecessary a dual ignition system on cars that are cranked by a starting motor at such a low speed that the ignition current from the ordinary magneto is insufficient to give certain ignition. Instead of using independent current, supplied by set of dry batteries or by some other source, the new Bosch system takes the primary current from the primary winding of the magneto and by means of an inclosed type of coil and a battery placed in series with the primary winding produces the high-tension spark necessary at the plug gaps.

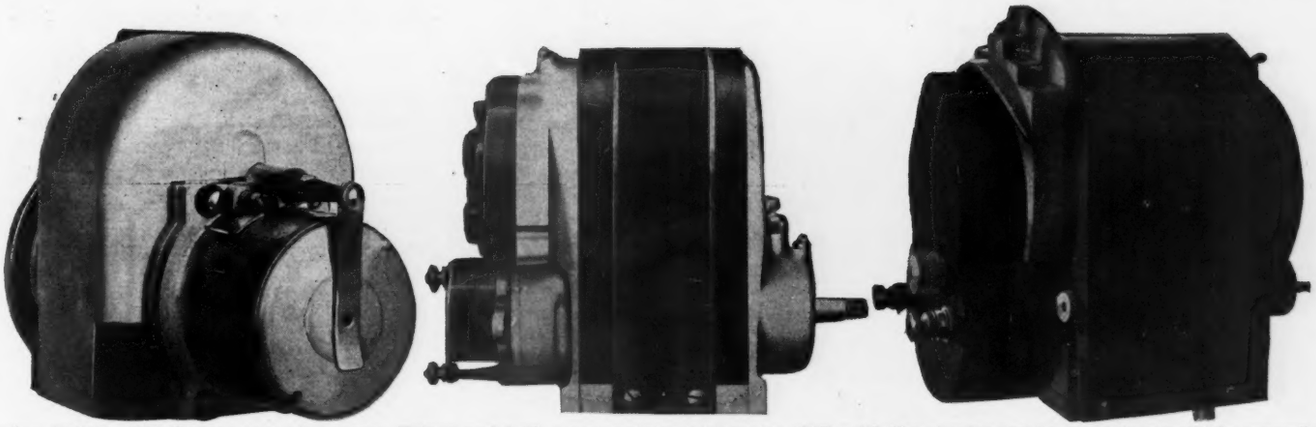


Latest model Eisemann magneto, the type G, which differs in many respects from previous Eisemann designs

Splitdorf — The features of the 1915 line of ignition instruments manufactured by the Splitdorf Electrical Co., Newark, N. J., are the Dixie and Cunningham, new high-



The two illustrations at the left show the model NU4, a new Bosch product, and at the extreme right is shown how this magneto is installed in the Ford car and driven directly by gears from the front end



From left to right the magnetos shown are: Heinze model 15, a new waterproof type for 1915, with the circular-section magnets completely covered; Remy model P, one of the leaders of this line; Briggs, with all parts neatly covered

tension magnetos, and the waterproof high-tension type for Ford cars. Splitdorf magnetos are made in both high and low-tension forms for all types and sizes of motors.

The Cunningham is a six-cylinder type, water and dustproof, whose range of spark advance is over 75 degrees, and which is claimed to give an exceptionally hot spark even at low engine speeds. The width and length of the base is that of the standard Splitdorf low-high tension magneto. The magneto flux is supplied by two tungsten steel magnets secured to pole pieces fixed to the base in the usual manner by screws and dowels. To the front and rear of the pole pieces are attached the front and rear plates for supporting and housing respectively the high-tension brush holder of rubber and the gears and high-tension distributer disk.

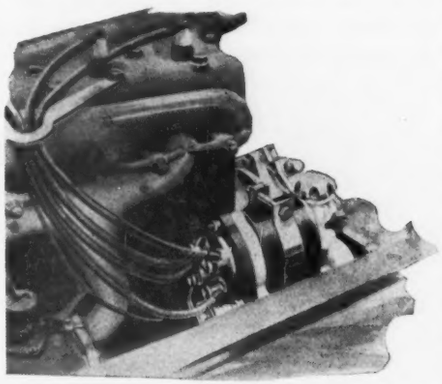
Below the distributer block with its six insulated retaining thumb nuts is the circuit breaking mechanism with its protecting cover and an insulated terminal for connecting to the small short circuiting dash kick switch. The circuit breaker rotates with the armature. To prevent the entrance of water and dirt between the end plates and the magnets, a japanned aluminum cover, with its edges overlapping the margins of the end plates, is employed.

The new Dixie type is said to give the same strength of spark at either advance or retard. It employs a field coil housed in the arch of the magnets and the platinum points mounted external of the main breaker box.

The Splitdorf-Ford magneto is a high-tension type requiring no machine work for installation and being driven directly by gears from the front end of the motor. The price is $45 complete and it is shown in an illustration on this page installed in a Ford motor.

Eisemann—The Eisemann Magneto Co., Brooklyn, N. Y., has in its 1915 line a new magneto called the model G, which differs altogether from others of this make. The complete line includes only high-tension magnetos for one, two, three, four and six-cylinder motors, those for single and dual ignition and those for manual and automatic spark control.

In the new model G a new armature, distributer, and breaker mechanism are used, and the complete magneto so covered



Installation of the Splitdorf magneto in a Ford car. This instrument is driven by gears from the timing gear housing

as to make it water and dustproof.

The magnets are covered by a sheet-steel housing, which is pressed into place in such a way that the joints are perfectly tight. The distributer housing is smooth, as shown in the illustration herewith, the terminal connections being inside.

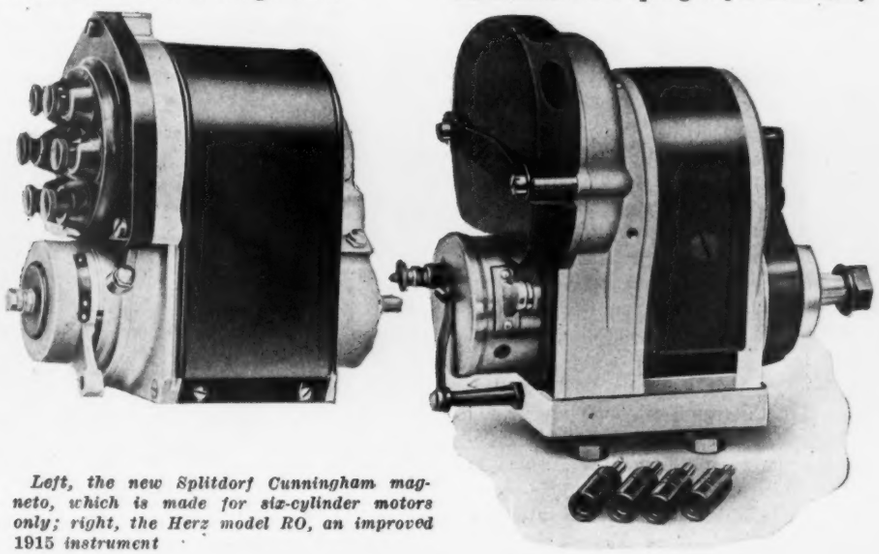
The magnets are essentially the same as have been used in the past, but due to a more efficient winding of the armature it has been found unnecessary to use double magnets. The distinctive Eisemann pole piece construction is retained. The pole pieces themselves are in the form of wedges with their thickest parts at the center of the armature, consequently the armature is at no time isolated entirely from the pole pieces.

The circuit breaker is entirely new. Instead of being a comparatively heavy arm there is a very light spring, A, in the illustration herewith, which carries one of the platinum contacts C and which rotates with the armature shaft; the other contact is mounted in the part which supports the spring.

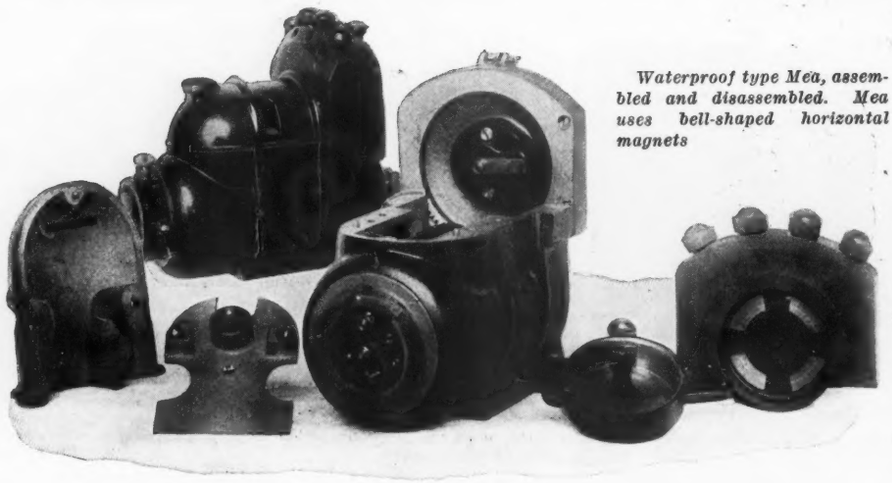
The auxiliary spring P is merely for the purpose of slightly increasing the pressure between the contact points; it is separated from the main spring by a fiber plug, B, in order to eliminate the possibility of trouble resulting from static conditions.

Made integral with the breaker box there is a small cylinder, with two fiber inserts and a third felt insert, the latter serving merely to lubricate the parts with which it comes in contact.

As the breaker mechanism rotates with the armature the spring wipes alternately



Left, the new Splitdorf Cunningham magneto, which is made for six-cylinder motors only; right, the Herz model RO, an improved 1915 instrument



Waterproof type Mea, assembled and disassembled. Mea uses bell-shaped horizontal magnets

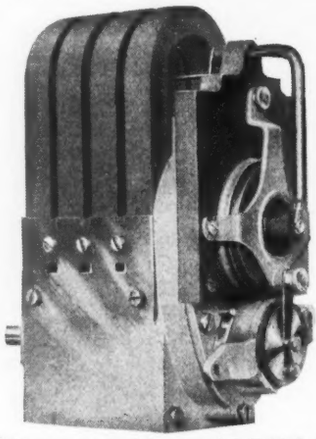
against the fiber inserts, thus making and breaking the primary circuit.

Remy—Nine types of magnetos are marketed by the Remy Electric Co., Anderson, Ind., and these are in four styles, known as the P, 32, 31 and 30. The first and second named are made in single-distributer models only and for two, four and six-cylinder motors. The models 31 and 30 are double-distributer magnetos, the former being made for four and six-cylinder motor and the latter for fours only.

All Remy magnetos are of the dual type and while the fundamental design is the same in all of them there are slight differences. The armatures are of the shuttle type, with laminated core, and operating on ball bearings. The use of the insulator Bakelite is a characteristic of these magnetos, the composition being placed wherever possible. The illustration herewith shows the model P Remy, which is a single-distributer type with a water and dustproof housing, both over the magnets and breaker mechanism. In the double-distributer types one distributer is at one end and the other at the opposite side.

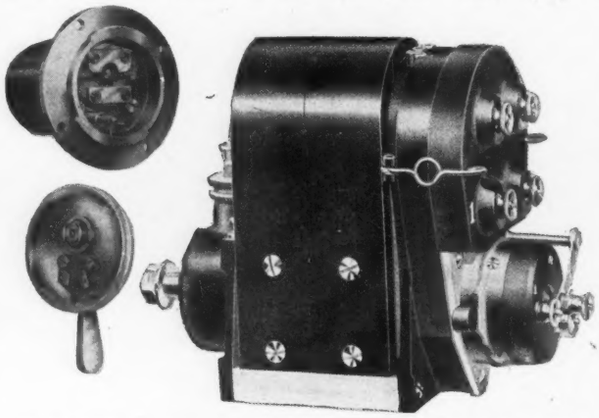
Mea—The waterproof types of Mea magnetos, marketed by Marburg Bros., New York, are practically new ones, although they still adhere to the characteristic Mea design of bell-shaped magnets placed horizontally and in the same axis with the armature, instead of the customary horseshoe magnets placed at right angle to the armature. The maker offers all types for one, two, three, four, six and eight-cylinder engines, all of them being of the high-tension design, using double windings on the armature shaft. The new waterproof types are called the A, FE and FD and they are offered in independent and dual form. One type is illustrated at the top of this page, showing the unit dismantled.

K-W—The K-W Ignition Co. offers its model H high-tension magneto unchanged for 1915 and also its impulse starting device for the type HT magneto, which is used on large tractor engines. This starting device is designed to give an intensely hot spark regardless of how slowly the engine is turned over. The armature of the magneto is held back until the time ignition should occur, when a spring gives the armature a quick impulse to produce the starting spark. This operation continues until the engine picks up its regular firing, when the device is automatically thrown out of action.



The K-W four-magnet type model H high-tension magneto

The model H magneto is a four-magnet type, with stationary winding entirely apart from the armature. The windings are concentric with the armature shaft and are mounted between two halves of a metal rotor, which collects the magnetism from one pole and conducts it through the center of the winding to the other pole.



Model S. U. D. Simms magneto which has the distributer held in place by two springs as shown above instead of by screws

The interrupter mechanism differs little from the conventional.

Connecticut—Independent and dual systems are marketed by the Connecticut Telephone & Electric Co., Meriden, Conn., unchanged for the past 2 years. Herewith is illustrated the type A-4, which, like other Connecticuts, has but a single primary wire running to the dash switch. The transformer coil is mounted above the armature shaft in the arch of the magnets. The coil is cylindrical in shape and housed in a metal tube, which threads into the magnets. A feature of the Connecticut is the ease of making adjustments, especially those of the interrupter points. A small hole in the side of the breaker housing allows of a file being slipped through for leveling the points.

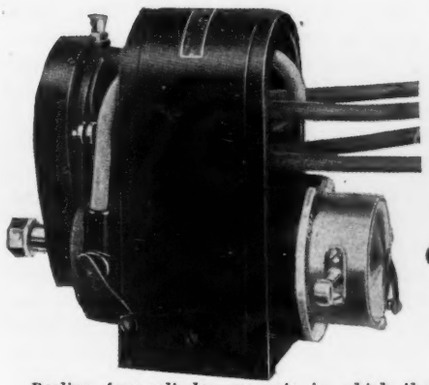
Swiss—The Swiss Magneto Co., Chicago, is manufacturing unchanged its one, two and four-cylinder high-tension magnetos. All have double-wound armatures and in the four-cylinder type the reduction gears and distributer are at one end and the interrupter mechanism at the other. The latter is offered for clockwise or anti-clockwise operation. With this magneto no switch is required, it being controlled by the spark lever, which in retard position short-circuits the instrument.

Berling—The Berling magneto, made by the Ericsson Mfg. Co., Buffalo, N. Y., differs in many respects from the ordinary high-tension magneto, although none of the features can be called radical. The timing gears are located at the front end, instead of the rear, and the distributer is placed inside the magnets, thus they are well-protected from oil and moisture. The high-tension cables are brought out from the distributer in such a way that they do not come in contact with any metal parts.

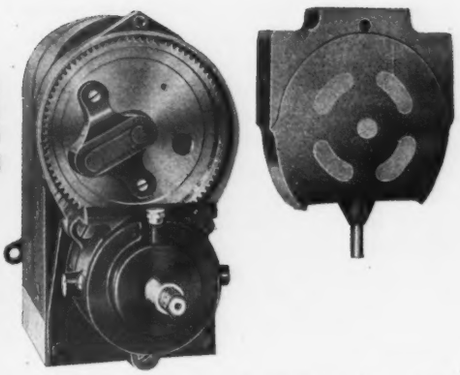
The cams which operate the interrupter are made integral with the interrupter housing, which insures good contact. As there are no binding posts on the housing cover, the interrupter can be inspected while the engine is running.

Ease of adjustment is a special feature claimed for the Berling interrupter, this being accomplished by loosening an ordinary screw locking the platinum screw. The latter has a hexagon head and is easily adjusted with a combination wrench and gauge provided for this purpose.

Herz—Two types of magnetos for motor cars are being marketed by Herz & Co., New York, and both of them have been improved over the 1914 types. The changes have been made in the breaker box, which now has a heavier shell with a long bearing. The contact breaker has been improved by fastening the



Berling four-cylinder magneto in which the reduction gears are located at the front end and the distributer is placed inside the magnets. Ease of adjustment is a Berling feature



Swiss, a Chicago-made magneto, showing the distributer arms and segments and the large reduction gear. The interrupter is at the opposite end

steel block, to which the platinum contact screw is attached, with two screws to the base. Another change has been in reducing the height of the instruments by employing a smaller distributer disk.

The two new types are called the models R and F, both of which are high-tension instruments, as is the case with all Herz magnetos. A type of model R is shown herewith. The Herz company is continuing to market its automatic time adjustment, a device for automatically advancing and retarding the spark. It is in the form of a coupling, consisting of two juxtaposed disks, inserted between the magneto and the driving shaft.

Each disk is provided with five curved grooves running in the opposite direction to those in the other disk. Five steel balls are held in these grooves. These balls act like the weights of a governor, being forced outward from the center by centrifugal force in direct proportion to the speed of the motor, and in this way impart a twist to the armature of the magneto in relation to the driving shaft.

Kingston—No new magnetos are in the 1915 line of the Kokomo Electric Co., Kokomo, Ind., the 1914 instruments being continued without change. The model H Kingston is the motor car type and as with all of this make is of the low-tension type using an outside coil. It is a two-magnet design furnished in two-three, four and six-cylinder types.

Simms—The only change in the line of magnetos marketed by the Simms Magneto Co., East Orange, N. J., is the addition of the model S.U.D., which is of the same design as former Simms instruments, except that the dirstributer has been altered. This now is held in place by two springs, as shown in the illustration herewith, instead of by screws, as formerly. Four types are marketed, all being of the high-tension type, with both windings and condenser mounted on the armature shaft.

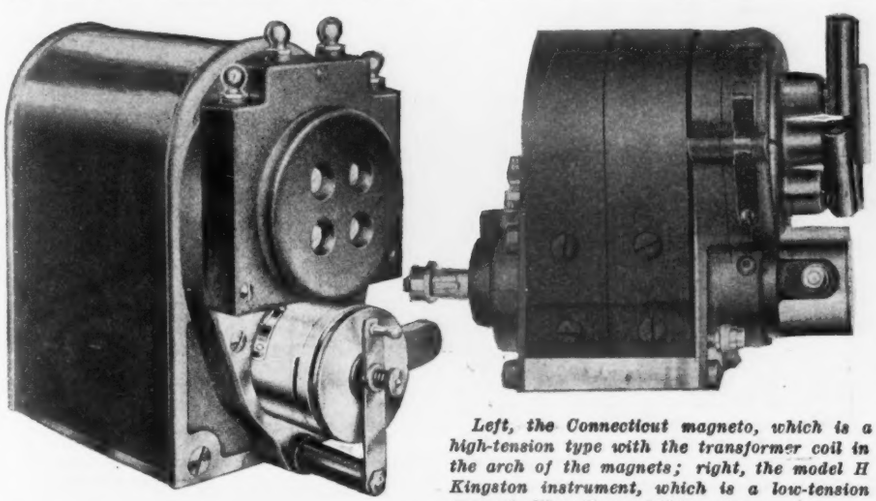
Heinze—The Heinze Electric Co., Detroit, and Lowell, Mass., is going into the high-tension magneto field more extensively than heretofore. In taking this step, four new magnetos have been brought out, these all of the high-tension form. Model 5 is the design best adapted to average conditions. Model 15 is a reversible type for use where the engine is made to operate in either direction of rotation. Model 13 is a motorcycle type, and the last of the four, model 23 is a very large six-magnet design for tractor engines. It is equipped with a starting coupling which permits of its being disconnected from the motor when the latter is started by some external means.

Model 5 is a four-magnet machine which is adaptable to small motors as well as average sizes. It is a waterproof construction, made to S. A. E. dimensions. It is made so as to attach to any motor where any other standard size of magneto can be placed.

Heinze magnetos have the distinguishing feature of round magnets rather than those of square or rectangular section generally employed. The concern believes that such magnets are more efficient, giving a stronger pull in the magnetic field. A very hot spark at low speeds also is claimed due to the special method of armature winding. The range of advance is from 50 to 55 degrees. This tends to a considerable flexibility of control.

Until this series of magnetos was brought out recently, the Heinze factory did not make much of a specialty of high-tension types, those of this form which were heretofore constructed having a make-and-break method of securing the spark.

Briggs—The Briggs Magneto Co., Elkhart, Ind., is continuing, only with minor refinements, its low-tension magneto known as the model C. It is made in two, four and six-cylinder types and carries the transformer coil separately, the armature being of the single-wound type. The external appearance of the Briggs is very clean as may be noted from the illustration of the magneto shown herewith. The interrupter, distributer and reduction gearing is carried at one end.



Left, the Connecticut magneto, which is a high-tension type with the transformer coil in the arch of the magnets; right, the model H Kingston instrument, which is a low-tension magneto like others of this make

Varied Fitments

PEERLESS Magnet Charger—An electromagnet for recharging magneto magnets is marketed by the Motor Parts Co., Springfield, Mass. It is an oddly-constructed type operating from any 6-volt source and will fully recharge a magnet in a few minutes. It sells for $35.

Gray-Hawley—The Gray-Hawley Mfg. Co., Detroit, principally contributes mufflers and exhaust cutouts to the trade. The cutout is designed to clamp directly to the exhaust pipe in which the proper size of opening has been cut to fit the opening in the cutout which is turned downward and backward at an angle of 30 degrees to prevent the exhaust from striking the ground and raising dust. It comes in a number of sizes to fit the exact outside diameter of the exhaust pipe, and is made for a tight fit without the use of packing. A torsion spring on the valve holds the outlet door on its seat, and an extra coil spring is furnished with each cutout to be used when cars have an unusually strong exhaust.

The Gray muffler has outer drums of steel which are asbestors-lined, lock-seamed and riveted, while the heads are packed with asbestos wicking dipped in a special cement to make them gas tight. The front end of the muffler is fitted with a safety valve which remains closed under normal conditions but opens should an

explosion occur within, and thus saves the muffler from severe strain. This muffler is now made in a special size to fit the brackets on a Ford car and furnished either with or without a cutout.

Vanguard Windshield—The latest product of the factory of the Vanguard Mfg. Co., Detroit, is the Ford De Luxe windshield and cowl. A form of two panel straight shield with straight side supports is fitted to a steel cowl, the whole thing being made to attach to the top edge of the Ford body. It attaches to the dash and body of the car at identically the same points and using the same bolts as are required with the windshield coming as standard equipment with a Ford. This makes its mounting easy. These cowls are made in two sizes to fit either the 1912-12 Fords or the 1914 and 1915 cars. In either size the assembly is sold for $20.

Bontempi Rust-Proofing—A process which produces a permanent black finish which is said to be rust-proof and which can be used as a priming cost over which to plate, enamel or paint and which will not flake is offered by the Bontempi Rust-Proofing Co., Bridgeport, Conn. The company will do the work at its own plant or will make installations wherever desired.

Battery Ignition Systems

WITH the almost universal employment of electricity for the lighting and starting of motor cars, there has been a very pronounced development in battery ignition systems. With the ever present source of current afforded by the starting and lighting battery, many makers have felt safe in relying upon the battery for ignition as well as for the other car units.

There is a greatly increased number of manufacturers of equipment designed to perform the function of ignition without recourse to the magneto and to provide more even firing and freedom from frequent adjustment necessary with the Ford type of low-tension magneto and separate vibrating coils.

One of the features of the year in the battery timer-distributor systems is the arrangement for automatically advancing the spark as the engine speeds up and automatically increasing the heat of the spark when it is required by the power needs of the engine.

Atwater Kent—The battery ignition system developed by the Atwater Kent Mfg. Works, Philadelphia, Pa., consists of the Unisparker, a coil and a reversing switch which is mounted on the dash. The system is made for four-, six- and eight-cylinder motors and the only moving part is the Unisparker, which is intended for vertical mounting.

The system, as the name of the principal part indicates, delivers a single intense spark at the plugs and the mechanism is such that the duration of current flow through the primary winding of the coil remains constant regardless of engine speed; also, the make and break mechanism is mechanically operated and is not dependent upon magnetism and hence operates regardless of the condition of the battery. Another distinctive feature of the system is that it incorporates a centrifugally-operated spark advancing mechanism which makes unnecessary the usual spark advance lever.

The Unisparker operates on the open-circuit principle; which is to say that the contacts normally are held apart. They come together for an exceedingly brief period—as a matter of fact, the operation of the breaker mechanism is far too rapid for the eye to follow—and are immediately separated again. Hence, the amount of current consumed per spark is small.

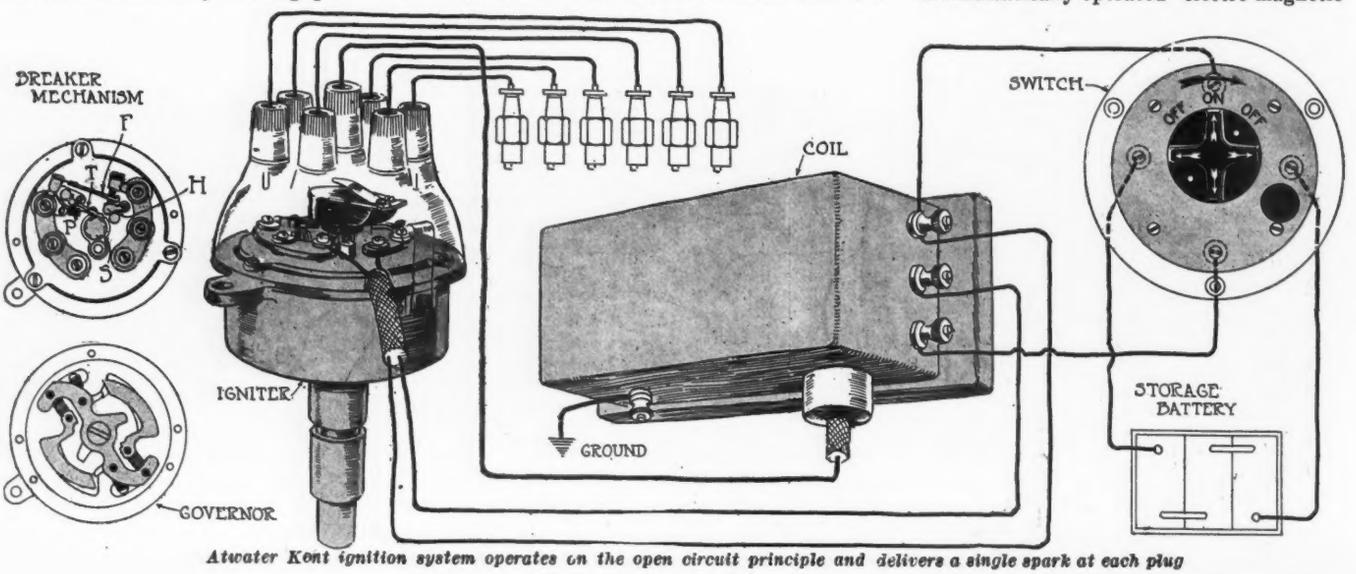
The shaft S, which is the rotating portion, has a number of notches—four, six or eight, according to the number of cylinders—cut in the sides. The trigger T catches in these notches and is drawn around a fraction of an inch with the shaft, when it escapes from the notch, rides up slightly on the inclined surface, and being returned to its normal position by the coil spring P, comes against the miniature hammer H. This hammer in turn strikes the flat spring F, permitting the contacts to come together.

The action of the automatic spark advancing mechanism is obtained from four weights distributed symmetrically about the two shafts of the device. The lower of these shafts projects through the casing and is the drive shaft. The upper shaft operates the breaker mechanism and is not positively connected to the lower one. The connection between the shafts is through two S-shaped cross pieces, one of which is permanently attached to each shaft and which are held opposite each other by light springs. When the shaft rotates slowly, it carries with it the upper shaft without varying the relationship of the two. But as the speed increases, centrifugal force separates the weights which are attached to the S-shaped cross pieces, causing them to separate radially, the upper one thus obtaining a slight lead over the lower one. As the upper shaft is directly responsible for the sparks produced, the ignition is automatically advanced.

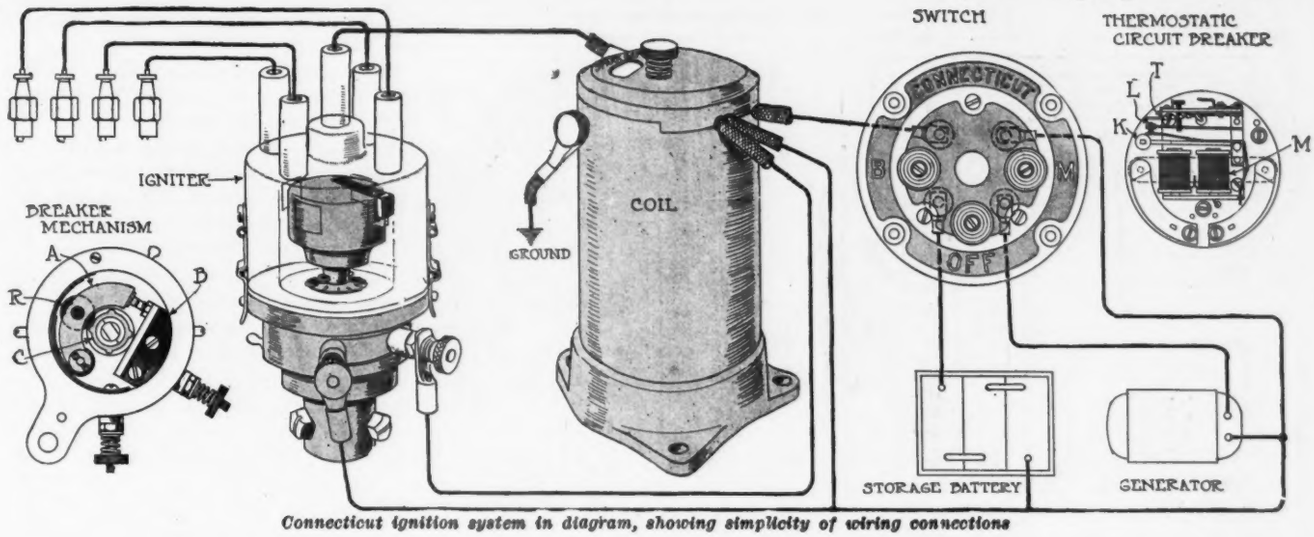
In addition to the standard Atwater Kent system, there is also a system designed especially for Ford cars. This consists of the same units together with a special bracket which is attached without machine work; it sells for $22.

Connecticut—This is a complete ignition system consisting of a combined timer and high-tension distributer, a separate coil and a switch.

The system is distinctive in a number of respects, prominent among which is the fact that the timer is so constructed that the primary circuit of the coil is caused to become thoroughly saturated, with the result that a spark of maximum intensity is produced. Another distinctive feature is the incorporation in the switch of a thermostatically-operated electro-magnetic



Atwater Kent ignition system operates on the open circuit principle and delivers a single spark at each plug



Connecticut ignition system in diagram, showing simplicity of wiring connections

device which automatically breaks the connection between the battery and the coil should the switch inadvertently be left on with the motor idle.

The breaker mechanism consists of the arm A, carrying one contact, a stationary block B, carrying another contact, a fiber roller R, which is carried by the arm A, and then the cam C, which is mounted with the driving shaft. Normally, the contacts are held together under the action of a light spring. As the four cams, which in touching the roller R raise the arm and separate the contacts are 90 degrees apart for a four-cylinder motor, the period of saturation of the coil or the length of time the current flows to it from the battery is at the maximum. Hence, when the contacts are separated, the current which has piled up, to use homely analogy, induces an intensely hot spark at the plug.

It follows as a matter of course that the slower the speed of the engine—the timer rotates at half crankshaft speed—the greater will be the saturation of the primary coil, and hence, the more intense the spark. It is largely this intenseness, coupled with the fact that mechanical lag has been eliminated by the simplicity of the mechanism, that electrical lag has been done away with. This means, briefly, that for a given setting of the spark advance lever, the spark will recur at exactly the same point in the piston travel regardless of engine speed. This is what is termed synchronism.

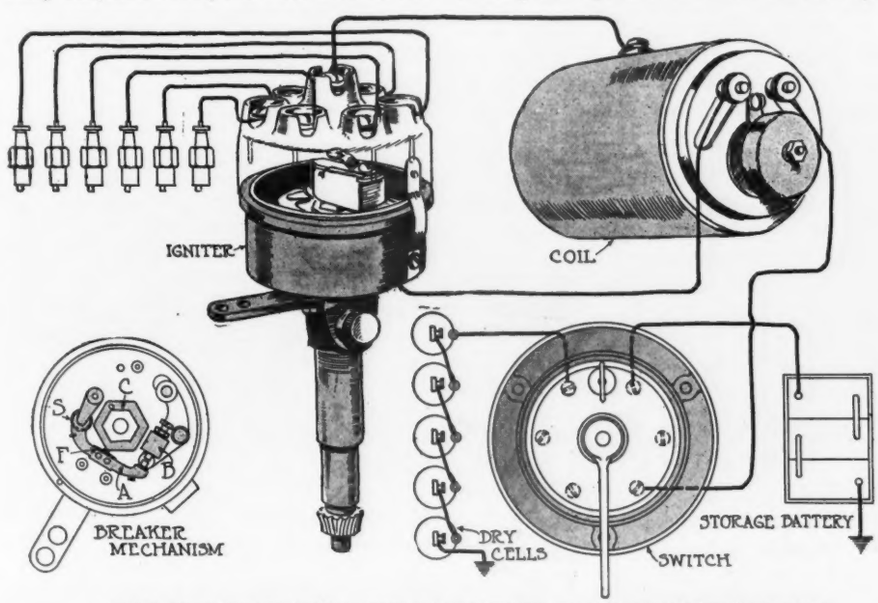
The thermostat circuit-breaking mechanism is enclosed within the switch. This consists of the thermostat T, which heats when the current passes through it for from 30 seconds to 4 minutes without interruption and is bent downward, making contact with the contact L. This completes an electrical circuit which energizes the magnets M, causing the arm K to operate like the clapper in an electric bell. This arm strikes against a plate, which releases whichever of the two buttons in the switch which may be depressed.

Bosch—The Bosch Magneto Co., New York, developed its battery ignition system 8 years ago and has made hardly any change except for minor refinements of detail.

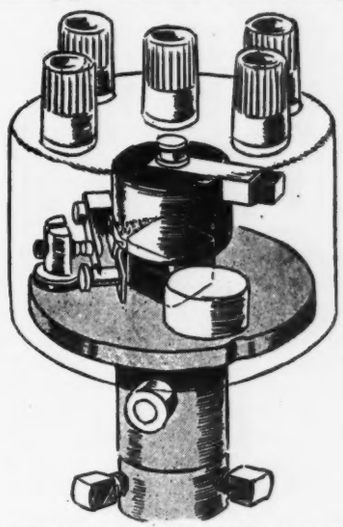
The complete system consists of a combined timer and high-tension distributer, and a combined switch and coil, the latter unit intended to be mounted with the coil behind the dash and the switch in front. The timer-distributer is mounted on a shaft through which it is driven by camshaft speed and may be placed in any convenient position.

The breaker mechanism, which is shown herewith in plan, is exceedingly simple; the rotating shaft S carries the cam C. The contacts are mounted one on the movable arm M, which is controlled by the spring S, and one in the stationary block B. As the cam rotates it rubs against the fiber piece F, thus separating the contacts. Provision is made for spark timing through the usual manually-operated lever.

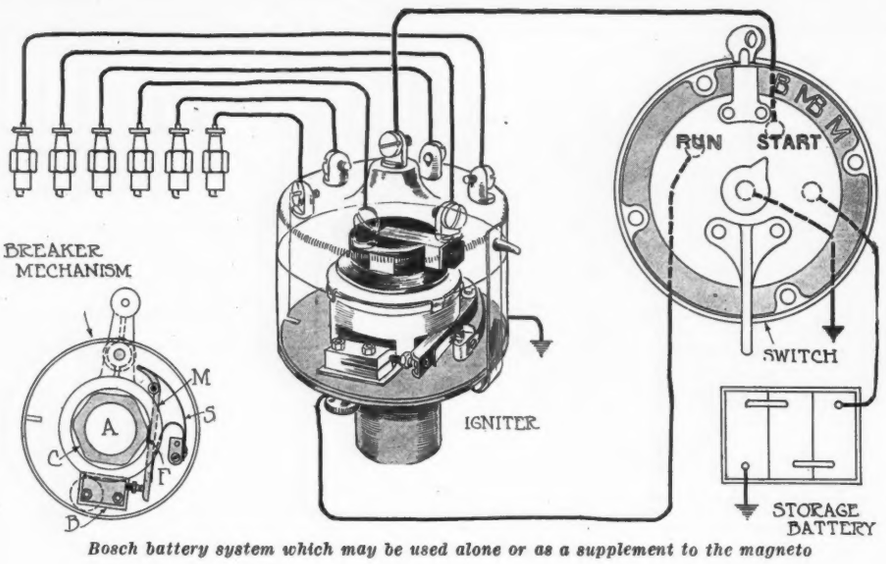
The switch is an ingenious mechanism which has a vibrator attachment to facilitate starting under adverse conditions. This mechanism is controlled by the pointed button in the center of the switch plate. Under normal starting conditions, momentary pressure on the button will pro-



In the Remy battery ignition system the operation is on the closed-circuit principle



Combined timer and distributer of the Halladay for Fords



Bosch battery system which may be used alone or as a supplement to the magneto

duce a single spark at the plug in the cylinder on power stroke. But if the motor is very cold and a succession of sparks is desired these may be obtained by turning the button to the right and pressing it, thus bringing the vibrator into use. If desired, the button can be locked in this position until the motor has started, when it is turned to the left, causing a single spark at each separation of the contacts in the breaker mechanism.

There are four positions of the switch for use when the system supplements a magneto. These are B, for battery; M, for magneto; MB, for the two together, and O for off. Two-, three- and four-cylinder outfits, complete with battery coil and cable, cost $45; the six-cyinder outfit costs $50.

Halladay Unit Coil Ignition—The unit coil ignition system for Ford cars has been brought out by the D. P. Halladay Co., Streator, Ill. It consists of a combined primer and distributer, which is mounted at the front of the motor. It may be operated from the Ford flywheel magneto or a battery. The price is $15.

The timer and distributer are mounted one above the other on a housing which bolts to the Ford crankcase, being driven by the timer-shaft, the old timer mechanism being removed. The particular feature claimed for this device is that it produces sparks that are perfectly timed and in synchronism, thus giving the same advantages that are obtained with the high-tension magneto.

Remy—The Remy Electric Co., Anderson, Ind., has developed its model 100 magneto type battery ignition system for use on cars which are equipped with electric lighting and engine starting systems and it is therefore intended to be operated on the usual 6-volt or 12-volt circuits. It is made for both four- and six-cylinder motors. The system consists of three parts, the combined timer-distributer, a coil which may be mounted in any convenient position, and a switch to go on the dash.

The make-and-break mechanism is simple in design and all the parts have been made as light as possible consistent with a proper factor of safety. The rotating shaft carries keyed to it a four- or six-faced cam C, which in rotating rubs against a fiber plug F, thus separating the contacts, one of which is carried by the movable arm A, which is returned to normal position by a coil spring S, and the other by the stationary block B.

The distributer mechanism is equally simple and is mounted in the same unit directly above the breaker. It consists of a radial arm keyed to the rotating shaft with a central spring contact which touches a carbon button imbedded in the Bakelite distributer cover. The distributer arm has a tiny pointer on it which comes close to a number of brass pins in the distributer cover to which the spark plug leads are connected. Thus, wear in this part is done away with.

Another important feature of the unit is that the advance and retard mechanism is entirely separate from the distributer cover, so that when the timing lever is moved the distributer cover remains stationary, obviating the possibility of chafing of the wires and consequent loss of high-tension current through leaks in the insulation.

The switch is a simple design, with a lever which may be operated by the foot. Three positions are provided, B for battery, O for off, and M for magneto, or, more properly speaking, the generator on an electrically lighted and started car. The lever can be locked in the off position with a key which is removable.

The distributer is intended to be mounted on a vertical shaft and driven through suitable gearing at half crankshaft speed irrespective of the number of cylinders.

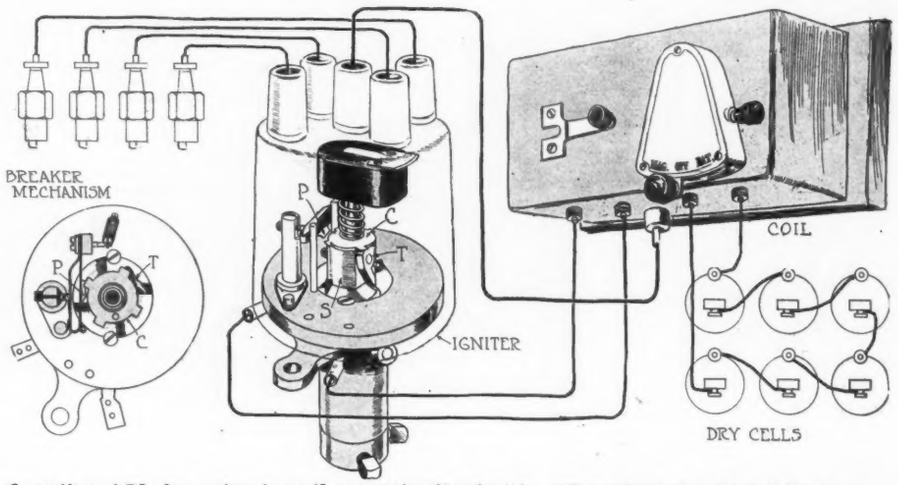
Rhodes—The Rhodes ignition system, which is produced by the New York Coil Co., New York, is made for both four- and six-cylinder cars and may be substituted for any timer on any car not provided with magneto ignition.

The complete system consists of a combined make-and-break mechanism and a high-tension distributer contained in a single casing and a simple non-vibrating coil with switch to be mounted on the dash.

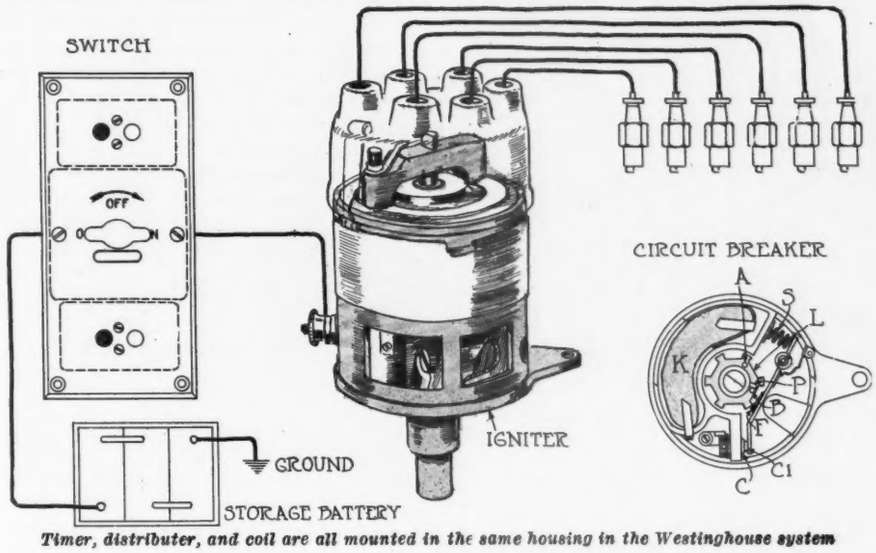
The make-and-break mechanism operates on the open circuit principle and it is impossible for the battery to be exhausted should the switch inadvertently be left in the on position because the contacts invariably come to rest separated. This is due to the unusual construction of the breaker, which is illustrated herewith in phantom.

The rotating shaft S carries with it a trigger T, which trips over four teeth E, and in doing so raises the notched collar C. This collar is keyed to the rotating shaft and as one of its notches comes over the projection P on the contact springs the trigger trips over its tooth, letting the collar down under the influence of a coil spring and thus momentarily forcing the contacts together and permitting them instantly to spring apart again. The inserted plan view of the breaker shows the position of the mechanism at the instant when the contacts are together.

From the foregoing it becomes appar-



Operation of Rhodes system is on the open-circuit principle with mechanical make and break



Timer, distributer, and coil are all mounted in the same housing in the Westinghouse system

ent that but a single, intense spark is produced at each break in the primary circuit of the non-vibrating coil; and as the current is permitted to flow through the coil but a fraction of a second, the drain on the battery is almost negligible.

The distributer mechanism is orthodox in construction. It consists of a radial arm carrying a brass segment which passes close to the four terminals from the wires leading to the spark plugs. As there is no rubbing contact, wear is reduced to the minimum.

In addition to the standard system for other cars, a complete system for use on Ford cars is produced. This uses the regular igniter and coil; it sells for $27, including the igniter bracket and all necessary fittings. In another Ford system, styled Uni-Coil, a different type of timer-distributer is used. This has a hardened central shaft into which four glass-hard pins are inserted at right angles. As the shaft rotates these pins force the contacts together in succession. The time the contacts are together may be adjusted. This system sells for $15 and employs one of the Ford coil units and the Ford switch.

Westinghouse—The battery ignition system which has been brought out by the Westinghouse Electric & Mfg. Co., located in East Pittsburgh, Pa., is made for both four- and six-cylinder cars, differs from others in that the primary current timer, the high-tension distributer, the coil and the condenser are contained in a single unit; the switch forms the other unit of the system.

The timer-distributer-coil unit, which is the heart of the system, is designed to be vertically mounted and operated from the cam or magneto shaft through suitable gearing.

The breaker mechanism, which is shown herewith in plan, is quite similar to that used in other Westinghouse instruments except that it is not provided with the automatic advance mechanism. The contacts C and C1 normally are held together under the action of a small coil spring S; the peculiarly shaped cam L is mounted loosely on the shaft and is turned by the pin P, which comes against the stops A or B, according to the direction of rotation. The unit operates equally well in either direction.

The condenser K is mounted adjacent to the breaker mechanism, these two units being beneath the coil and the distributer. The condenser, coil and breaker mechanism are enclosed in a tube of Bakelized Micarta, which forms the body of the unit.

The high-tension distributer is the same as that used in the regular Westinghouse generators and gives a wiping contact. There are two round brushes pressed apart by a small coil spring, one of the brushes making contact with the terminal from the coil and the other rubbing over the six contacts which connect with the wires to the spark plugs.

Apelco Timer-Distributer—The Apple Electric Co. manufactures a combination timer-distributer to be used in connection with a transformer and battery. It is similar to that used in the Splitdorf-Apelco electric battery. A timer plate carries all of the primary contact parts, consisting of a shaft with a four-nosed cam, which, when rotated, strikes a pivoted arm having a fiber bumper at one end. The pivoted arm causes a pair of platinum points to come together in a positive manner, and long enough to build up the transformer to its maximum.

Gibson Master Vibrators—One of the features of the Gibson Automobile Co., Indianapolis, Ind., is its line of master vibrators, several of which are specially designed for use in improving the ignition of the Ford.

Heinze—Heinze Electric Co., Lowell, Mass., is manufacturing a line of ignition apparatus. This concern's design of wipe-contact timers uses a wipe contact between a hardened steel blade and phosphor-bronze brushes. It has the self-lubricating feature, a spiral groove being cut in the bronze bearing. This is packed with graphite, which performs the dual function of lubrication and providing a good electrical contact. Four-cylinder instruments list at $5 and six-cylinder at $6.

New Era Master Vibrator—A master vibrator, which lists at $7, is manufactured by the New Era Spring and Specialty Co., Detroit, Mich., and marketed by Smalley Daniels, Detroit, Mich. It is specially designed for the Ford car, and its feature is the spark points made of a special alloy, said to be harder than the conventional platinum points.

Kingston Master Vibrator Coil—The Kokomo Electric Co., Kokomo, Ind., along with its other ignition specialties, makes two styles of master vibrator coils, one in a highly-finished mahogany box for dashboard installation, at $25.50, and the other, without the box and designed to fit in the metal coil box of the later Fords, sells at $17.50.

Bemus Timer—A new model of the Bemus timer, adapted to the Ford, has a feature in its method of mounting. Instead of mounting the timer shell in the gear housing and depending on this to bring it concentric with the time shaft, the timer shell is mounted upon an extension, turning in the latter. This construction brings the timer shell, with its ball contacts, concentric with the time shaft, on which the brush holder is mounted in the regular manner and thus prevents any tendency to irregular firing. It is made by the Motor Specialties Co., Waltham, Mass., and sells for $2.25.

Brown Master Vibrator—The Brown Co., Syracuse, N. Y., makes a master vibrator whose feature is the elimination of any tendency to sticking of the vibrator points. This is accomplished by separating the points by a sharp blow, instead of their being drawn apart, as in the conventional type. It sells for $10.

B. & S. Synchronizer—The feature of the master vibrator of Briggs & Stratton and marketed by Fulton-McCutchan Co., Chicago, is a synchronizer for Fords equipped with a Yale lock, thus making the car thief-proof. It sells for $12. A cylindrical type without the lock is listed at $8.

Blitz Ford System—The Blitz ignition system was specially designed by the Electrical Specialties Mfg. Co., Omaha, Neb., to provide a unit timer-distributer, which replaces the stock Ford apparatus. It is designed to give uniform spark, perfect timing, easier starting and smoother running. It sells for $15. and can be installed without machine work or extra parts.

J. & B. Master Vibrator—The J. & B. Mfg. Co., Pittsfield, Mass., is making a master vibrator at $8 whose feature consists in the exceeding long life of the sparking points. These indestructable sparking points are a specialty of the J. & B. concern.

Spark Plugs

MANUFACTURERS of spark plugs have improved their products mainly to the extent of making them more proof against the action of oil and carbon and so sealing the joints that compression losses are reduced. The elimination of multipiece plugs is a noticeable trend and a few makers have brought out plugs which show no paths for the escapage of mixture. Priming plugs are more in evidence than ever before and especially has this type found favor with the owners of Ford cars which is apparent from the list of manufacturers who have brought out special types for this make.

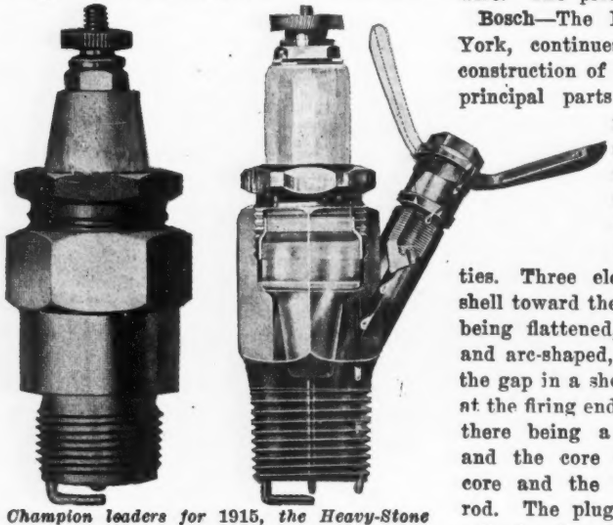
Champion—From the plant of the Champion Spark Plug Co., Toledo, spark plugs of a variety of types emanate. The metric and the ⅞ eighteen-thread sizes are furnished. The plugs that are featured are the Heavy Stone one-piece plug, Heavy Stone two-piece design and the new form of priming plug.

The first of these is made of very heavy materials throughout and is specially adapted to strenuous work such as in racing cars. These plugs, which are fitted as factory equipment on the two larger Overland models of this year, are made so that leakage is said to be entirely impossible since the entire core is inclosed by gaskets and by the shell construction whereby the top of the shell is turned over around the core by a specially developed process. In this plug, the turned-over top of the shell takes the place of the top nut usually found on spark plugs. The core is made of a special insulating material.

The two-piece Heavy Stone is essentially the same plug, that is, made in the same way with the same materials, but with the exception that it has the added feature that it can be taken apart for cleaning or for core replacement.

The latest form of the priming plug has a needle valve priming cup as an integral part of the shell. It is similar to Champion's former priming plug in this respect, but it has the new features of a handle for turning the needle valve so as to admit the gasoline to the cylinder, and also a new steel needle valve which is hardened and ground to a compression-tight seat in the priming portion of the shell. There is an opening in the top of the needle valve for insertion of the oil can spout. Having filled the priming cup, which is the inner part of the needle valve itself, the valve is raised from its seat by turning the handle. This allows the gasoline to flow through the side of the valve and down through its own channel to the plug base.

The price of either of the plugs mentioned is $1.25, but Champions come in 75-cent and $1 types as well. There is a special form for Fords which is standard equipment at the factory. This is a special ½-inch plug, known as the Champion X, and it has a straight center electrode with a hooked form of side wire. The price is 75 cents.

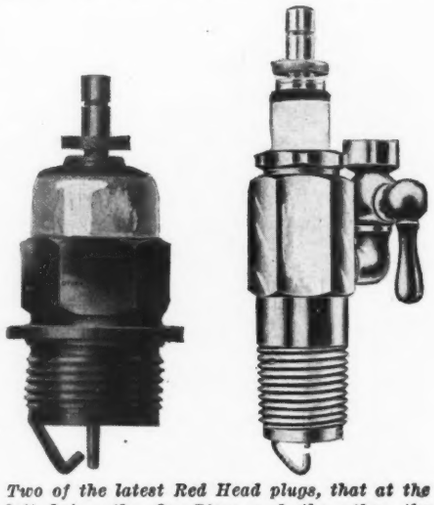


Champion leaders for 1915, the Heavy-Stone two-piece and the new priming plug

Bosch—The Bosch Magneto Co., New York, continues its line of plugs, the construction of which consist of but three principal parts: a central electrode, a one-piece insulator and a steel shell. The plug is of heavy construction, the core consisting of Steatite, a material having exceptional insulating properties. Three electrodes project from the shell toward the central electrode, the ends being flattened, brought to a knife edge and arc-shaped, so that the current passes the gap in a sheet of flame. The air space at the firing end is very deep and is double, there being a space between the shell and the core and another between the core and the lower end of the central rod. The plug is made in all sizes and sells for $1. The Bosch spark plug hood, which completely incloses the upper part of the plug, rendering it waterproof, is made with a Steatite main body with asbestos packing and an insulated cap which screws over the top; the hole for the cable is tightly filled by the insulation. The price is 45 cents.

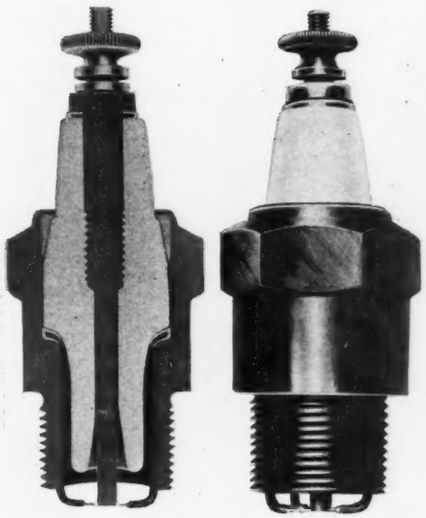
Bougie Mercedes—Herz & Co., New York, is continuing this year Bougie Mercedes spark plugs without any change over last year's types. Detail improvement has been made, however, by enameling the combustion chamber end of the stone core to prevent the adherence of carbon. The feature of this spark plug is that it uses an insulator made of blue enameled stone which is baked at a temperature of 2,000 degrees so as to be able to withstand the intense heat in the cylinder. The insulation consists of two parts. The inner member is tapered and is ground gastight into the steel shell. No packing is used. The inner stone gradually decreases in diameter towards the electrode, forming an explosion chamber behind the electrode. The soot is blown out by each explosion, thus making the plug self-cleaning. The prices of the standard types are $1.50 and for the long type, $2.

Red Head—The Emil Grossman Mfg. Co., Brooklyn, N. Y., maker of Red Head spark plugs, has just brought out a new one called the Big Boy and only a short time ago introduced the One-Piece. The newer plug is for high-duty motors. It has three parts, the shell, bushing and combination terminal screw baked into the shell. The firing points are three in number and made of heavy steel which is bent to cause all oil to flow away from the point ends. Its price is $1.



Two of the latest Red Head plugs, that at the left being the One-Piece and the other the priming plug

The Red Head priming plug for Ford cars is practically new also. This is shown herewith and it will be noticed the priming portion is in the form of a simple control cock through which gaso-



Section and exterior view of the 1915 Bosch spark plug which uses a Steatite core

line is poured. This runs through the plug directly upon the firing points. The price is $1.25.

Instead of using a bushing for stuffing the porcelain into the shell, the One-Piece has the insulator cemented into the shell. The appearance of the new plug also differs from previous types of this make in that the porcelain is dome-shaped instead of tapered.

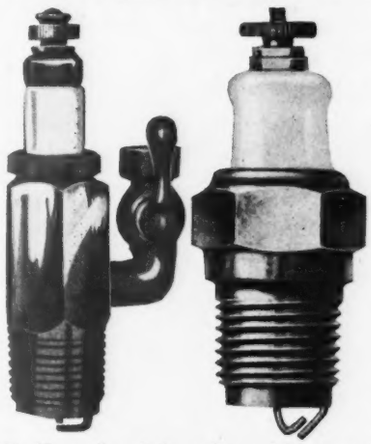
In making this plug the cement is poured into the space between the porcelain and internal threads of the shell and the entire plug then baked. This construction does away with gaskets and makes for a leakproof joint. The terminal screw also is sunk and baked into the porcelain and the grounded electrode is bent so as to keep oil away from the gap. This new plug sells for 75 cents; in all sizes.

Auburn—The Auburn Mfg. Co., Auburn, N. Y., has brought out a new type of plug for 1915 called the Carbon-Proof, shown herewith. This plug is said to have three desirable qualities—it is oil-proof, carbon-proof, and leakproof. In preventing carbon deposits, due to burning oil, the maker has used an unusual means, that of fastening a coil of nickel-steel wire to the bottom of the shell, as shown herewith. The center electrode comes out at the bottom of this coil and the spark is made to jump to four grounded terminals, each of which is slightly turned up at the end. This prevents any oil, which may accumulate, from getting upon the sparking points. In order to prevent leakage of gas the no-bushing construction is used. The price of the plug is $1.50.

V-Ray—The V-Ray Co., Marshalltown, Ia., is manufacturing a special plug for Ford cars and also its regular V-Ray plugs. Included in the line are plugs that will fit every motor manufactured. The construction is practically the same in all cases, though the details are varied and in most cases there is a choice of core material; for all except the heavier types of plugs, porcelain is the regular equipment. A single electrode is used and four shell electrodes which converge toward the center. The lower end of the insulating core is inclosed in a large combustion chamber. An illustrated shell has been prepared by the company showing a series of shells that will fit all standard makes.

The V-Ray company's most recent accessory is in the form of a unique double-end, offset spark plug wrench. This wrench is sold in the United States at 15 cents and in Canada at 20 cents. One end is offset to permit the ready removal of plugs that are screwed into a recess in the motor. The other end fits practically every bushing.

Bethlehem—The Silvex Co., New York, manufacturer of the Bethlehem spark plug, continues its line with no new models being added, no changes made in the construction, and prices remaining at $1.25 for all sizes. All the plugs have four steel electrodes and either mica or porcelain insulation. The models differ chiefly in the matter of length and details to adapt them to use in various standard cars.



Left, Monarch priming plug; right, new A-C Cico from the Champion company, Flint, Mich.

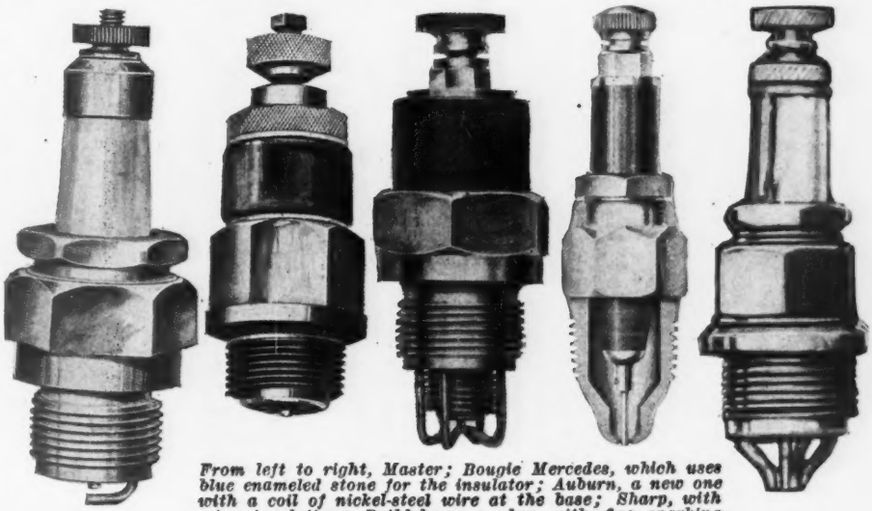
A. C.—The Champion Ignition Co., Flint, Mich., is manufacturing three models of spark plugs, two of which are new. These are the A. C. Titan and the A. C. Cico, of the non-detachable type, the porcelain core being permanently fixed in the shell. The A. C. plug is carried over without change and is of the conventional type with removable porcelain. The A. C. Titan is made in long and short models, listing at $1; the A. C. Cico at 75 cents. This company makes all its own porcelains.

Monarch—The Benford Mfg. Co., Mount Vernon, N. Y., announces a Monarch special Overland plug. This plug is the same as its Monarch porcelain plug, but made with a long-shank shell. This is necessary to bring the spark below the thick wall of the Overland cylinder. The price is 75 cents. Nine other types also are manufactured. The electrodes in all the plugs are made of nickel-alloy wire and the porcelains used are made from a special formula. Several of the plugs have hooked or curved outer electrodes. The rest have the regular points. All but one of the plugs use porcelain. The Monarch priming plug is manufactured, selling for $1.25. This is constructed like the new Overland plug.

Mosler—A. R. Mosler & Co., New York City, announce this year the Vesuvius spark plug, listing at $1. The feature of the plug is the continuous knife edge construction in its electrode, giving an indeterminate number of sparking points. The company also states the plug is gas tight. It continues the Spit-Fire plug with special base construction and platinum point, listing at $1.25.

The Mosler priming plug illustrated on the next page is continued for 1915 without change. This plug has a small cup in the shell into which gasoline is poured and then by turning a valve the fuel runs through the plug upon the firing points.

Sharp—The Sharp Spark Plug Co., Cleveland, O., has brought out no new motor car plugs for 1915 and is marketing the following plugs without change over 1914 types: Sharp, Goliath, Ford special, Mica special, Firefly, Baby Sharp and



From left to right, Master; Bougie Mercedes, which uses blue enameled stone for the insulator; Auburn, a new one with a coil of nickel-steel wire at the base; Sharp, with mica insulation; Bethlehem, a plug with five sparking points

priming plugs. These plugs are made in all standard sizes and with porcelain and mica insulators. The Sharp plug, illustrated herewith, lists at $1 and the Ford special, made in mica only, at 75 cents. Two priming plugs also are carried and these list at $1.25.

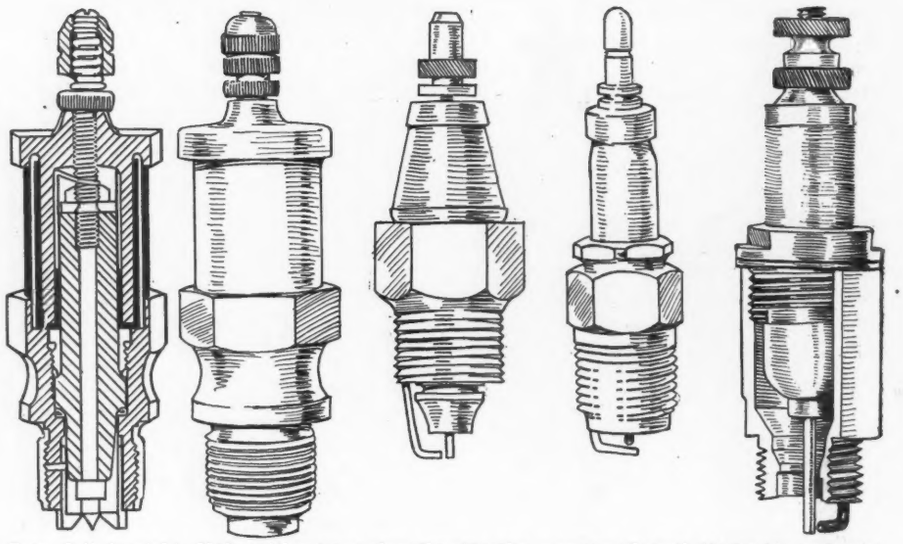
Sturdy—Four types of plugs are manufactured by the Sturdy Mfg. Co., Chicago, and these are the Gotham, Venus, Vulcan and Sturdy, two of them being illustrated herewith. The feature of these plugs is the use of double porcelains, so that breakage of the insulator due to expansion and contraction is eliminated. The Venus is a mica type and sells for $1. The others also list at $1.

Splitdorf—This make of plug from the factory of the Splitdorf Electrical Co., Inc., has been standard for a number of years and is marketed in two forms, the Common Sense, with mica insulation, at $1, and the Service, with porcelain insulation, at the same price. All sizes are offered and many special types are made, for such cars as Buick, Ford, etc.

The Service plugs have heavy sparking points, so as not to foul easily. The core is of India mica rolled on a tapered pin, so as to make it gas tight. The porcelain is heavily glazed.

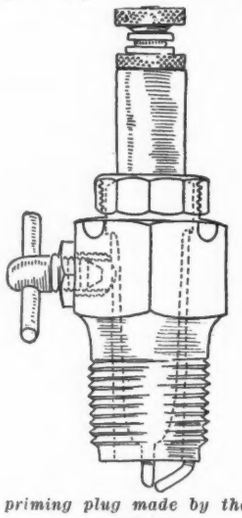
Rajah—No addition or detractions have been made in the line of Rajah plugs, manufactured by the Rajah Auto Supply Co., Bloomfield, N. J. All of these plugs have porcelain insulators and with the exception of the priming type and the Giant model the price is $1.25. The latter two sell for $1.50. Besides the line of spark plugs, the Rajah company markets clip terminals of various styles and a spark plug hood which covers the greater part of the plug.

Reflex—The Sure-Pop, a plug selling at 75 cents, is the only addition to the line of the Reflex Ignition Co., Cleveland, O., for 1915, the rest of the line comprising thirteen different types of plugs, all of which are made in various sizes.

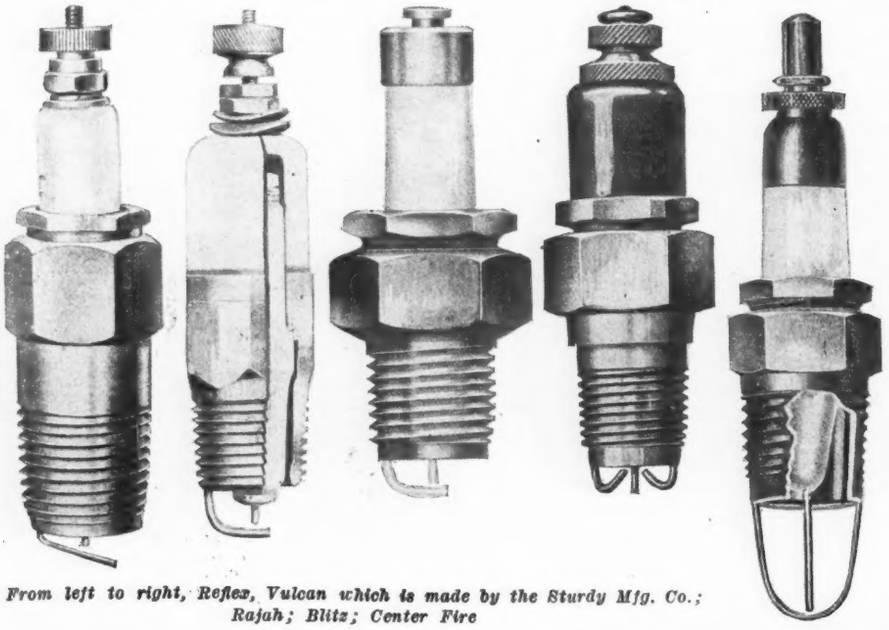


From left to right, McCormick power plug showing also a section through it; Ezekleen showing oil-shedder at the base; Long Distance; Sootless

Reflex plugs are built with a deep combustion chamber inclosing the end of the plug. The end wall carries a round hole for the spark gap. This construction exposes a large surface for sparking purposes enabling the spark to work all around the electrode. The concave baffle on the electrode at the base of the porcelain reflects the soot and dirt away from the interior and out through the spark gap at every explosion; thus keeping the inside free from short-circuiting matter and prevents carbon gathering on the points.



Simple priming plug made by the Mosler company

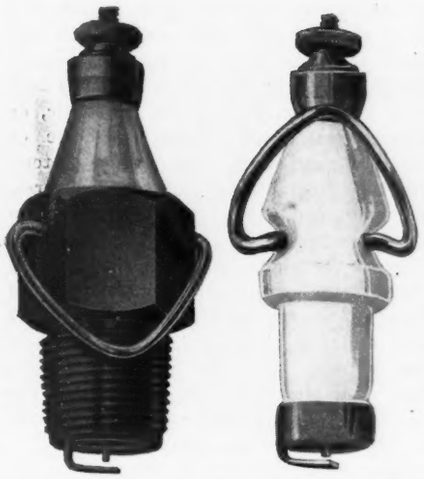


From left to right, Reflex, Vulcan which is made by the Sturdy Mfg. Co.; Rajah; Blitz; Center Fire

Pittsfield—These plugs, which are properly called Western-Electric Pittsfield, and made by the Western Electric Co., Dalton, Mass., are in three forms, those with porcelain insulators, those with mica, and those with a combination of porcelain and mica. In the combination plug the mica portion is external, thus protecting the plug from breakage, and the porcelain is inside, where it is needed to withstand the heat. This plug sells for $1.25, the mica alone at $1.00 and the porcelain at 75 cents.

Center Fire—The Milwaukee Auto Specialty Co., Milwaukee, Wis., which is marketing Center Fire plugs, is continuing them unchanged. The Center Fire has the grounded electrode in the form of a loop attached to either side of the shell, the center electrode extending straight down to within the proper distance of the ground. This construction places the sparking points well into the combustion chamber and away from the cylinder metal. The plug is made in conical-porcelain form and sells for $1.25.

Blitz—This is a plug of unusual construction and is made by the Randall-Faichney Co., Boston, Mass. The insulator is made-up, consisting of a petticoat type porcelain, within which is a mica foundation. Around this unit is placed a jacket or porcelain, so that the plug has a thick insulator, as shown in the illustration herewith. This series of protective coats makes the plug proof against breaks and also makes the interior mica immune against the action of oil. The plug is



Bobra, a new type, which is made in two parts which are easily separable

taken apart easily for cleaning purposes. Its price is $1.

Sootless—Oakes & Dow, Boston, Mass., are the makers of this plug, which is called Sootless, from the fact that it does not become clogged with soot readily. Both porcelain and mica are used in its construction, the former being used where extreme heat conditions prevail and the mica on the outside. This concern also markets the Comet plug, which is a peculiarly constructed one, using a porcelain insulator wound with sheet mica and reinforced at the lower end with an extra winding. The price is $1.25, and $1.50 for the Sootless which is illustrated in a group on the previous page.

Peco—The Power & Efficiency Co., Trenton, N. J., is manufacturing a plug for two-point and single ignition, listing at $1.25. One of the features of the single ignition plug is the outside ground or keeper. By moving the keeper from contact of the brass gland, where the current is grounded, it forms an outside gap, which shows how the spark is working in the cylinder. This can be seen day or night, without the aid of light. A lead pencil will open the gap and when removed it springs back into contact. Another feature is the double-wedge concave shape of end of insulation, preventing the depositing of any carbon. At every explosion the insulation is scoured and remains perfectly clean. The double ignition plug is different from the single in that it is without the concave shaped end. The Peco plug is illustrated in the group at the bottom of this page.

Su-Dig—The Superior Motor Specialty Co., Philadelphia, Pa., is manufacturing series plugs for double ignition, called the Su-Dig. These work with any ignition system, battery or magneto. They are placed between the magneto or coil and the regular plugs. Where possible, they are located over the inlet valves, and the regular plugs are placed in the center of the cylinder heads or over the exhaust valves. The electrodes are two-point. The porcelain insulator is tapered at the end of the plug. The thumb nut of the regular plug is at the top, but on the other plug there are two thumb nuts, on opposite sides of the insulation, one for the connection to the regular plug and the other for the magneto connection.

McCormick—The McCormick Power Plug, which is unchanged for 1915, combines a sparking device, an electrical condenser and a self-contained gas chamber. These three units in action produce a plurality of intense sparks moving between heavy cone surfaces instead of wire points. This transformation of battery or magneto current into a large number of high-frequency sparks is said to make explosion certain even though the mixture in the cylinder be poor. The McCormick plug is shown herewith. Its price is $2.00 and it is made by the McCormick Mfg. Co., Dayton, Ohio.

Long Distance—No changes have been made in the line of plugs manufactured by the Long Distance Spark Plug Co., Indianapolis, Ind. This is a porcelain plug selling at $1.50 and is illustrated on the previous page.

Kingston—Kingston plugs for 1915 are unchanged. Two types are marketed by the maker, the Kokomo Electric Co., Kokomo, Ind. These are the Kingston Mica and the Melalith. The latter is of unusual construction using an imported material called Melalith for the insulator. The Mica sells for 90 cents in S. A. E. and metric sizes and for 75 cents in the ½-inch. The Melalith sells for $1.00. A Kingston spark plug is illustrated on this page.

Ezekleen—The Ezekleen plug manufactured by the Perpetual Spark Plug Co., Dunmore, Pa., is one of special construction using the compound Kaolin for the insulator. This insulator is placed in the body of the plug so that there is no pressure on it, this being accomplished by separating the insulator from the body by a special compound which locks the insulator to the body. The construction is said to make a plug which is proof against leakage and the construction of the lower portion of the insulator as shown in the illustration herewith, is claimed to make the device short-circuit proof.

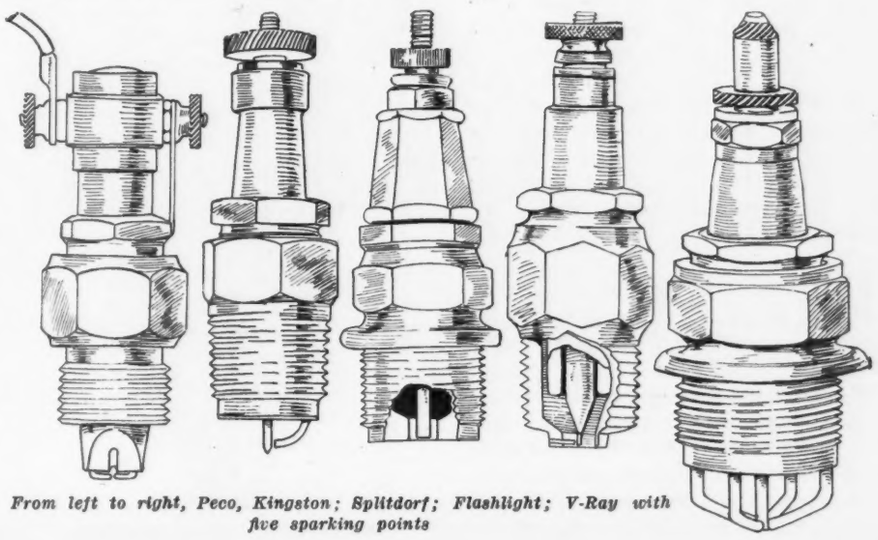
Master—The Hartford Machine Screw Co., Hartford, Conn., offers two types of plugs, the Master and the H. M. S. Bull-Dog, the former being the leader. It uses a conical porcelain insulator fitted into the core so as to allow for expansion room and its price is $1.00. The company will shortly bring out a special type for Ford cars.

Flashlight—This is a porcelain plug manufactured by Jenny, Steinmetz & Co., Philadelphia, Pa. The center electrode is surrounded by a pencil-shaped insulator and this in turn is enveloped by a larger one. The sparking points are on a level with the bottom of the plug and within a small chamber, called the firing chamber. The price is $1.00 and it is illustrated on this page.

Bobra—A new type of spark plug which has a quick-detachable feature by which it is possible to remove the insulator from the body, is marketed by the Bobra Spark Plug Co., Dayton, O. By making the insulator and body instantly separable, the use of priming cups becomes unnecessary because liquids may be poured into the cylinder through the open plug body. This construction also has the advantage of easy examination and cleaning of the center electrode. It sells for $1 and is shown on this page together with the insulator after it has been removed.

Red Seal—J. H. Faw, New York, is offering for 1915 a line of Red Seal spark plugs in six styles; regular ½-inch, Ford type, metric, 7-8 standard, Buick 7-8-inch and an open-end priming. All of these are porcelain types and have been marketed by the concern for the past four years.

Wizard—The Hampshire Mfg. Co., Hatfield, Mass., offers for 1915 its two brands of plugs, Wizard and Rival, the former made in either porcelain or mica form, and selling at $1, and the latter listing at 50 cents with porcelain insulator. Special types are made for Ford, Metz and Buick cars.



From left to right, Peco, Kingston; Splitdorf; Flashlight; V-Ray with five sparking points

Speedometers

SPEEDOMETER manufacture seemingly has reached a firm basis of design, as there has been very little change in design and nothing new in basic principles of operation developed within the past 12 months. New models have been added to previous lines in nearly every case, and new combinations developed.

One type of Stewart speedometer

There is a largely increased number of models of low price and specially designed for application to the Ford. Nearly every speedometer concern lists a special model for this car at something under $15.

There has been more development in the driving means. The American-Magnetic has a new design of vanadium steel flexible shaft; Van Sicklen has a novel type of gear in its transmission. Hub odometers seem to be coming more into favor in truck practice, most of them being arranged to prevent the driver tampering with their records. More attention has been paid to this type to prevent damage by collision.

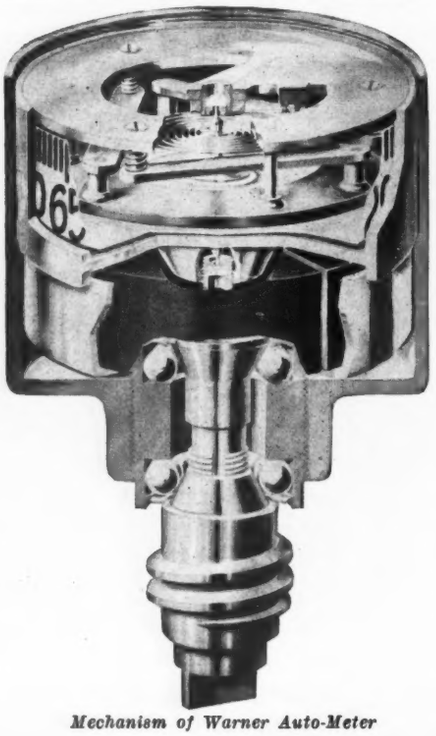
Speedometers are operated either magnetically, by centrifugal force, like a governor, or pneumatically, by the circulation of air.

Stewart-Warner—Speedometers of the magnetic type but of two different designs are produced by the Stewart-Warner Speedometer Corp., Chicago. One of these is the Stewart and the other the Warner Auto-Meter. Practically no change has been made in any of these instruments for this season, the only alteration being the extension of the internal illumination to a number of models not hitherto so fitted. Two new clock combinations have been brought out. One for Pierce-Arrow and the other for Locomobile cars. A hub odometer for trucks and light delivery vehicles has been produced whose chief feature is simplicity and ruggedness.

Stewart speedometers appear in wide variety of models, including both the pointer type and those with rotating speed dial. A special Ford instrument at $12 is included. The Warner instruments are all of the rotating speed dial type and range in price from $50 to $125.

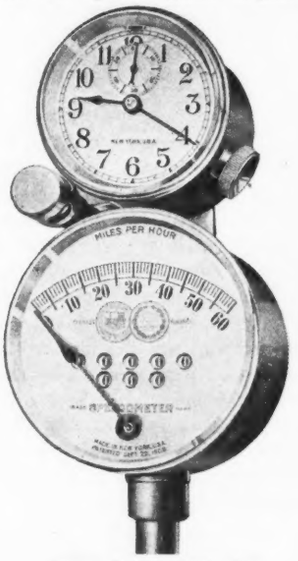
Both the Stewart-Warner instruments are of the magnetic type and operate on somewhat similar principles. This can be explained by reference to the cut-out view of the Warner instrument wherein it will be seen that the speed indicating mechanism of the Warner Auto-Meter consists of two composite units. One, the magnetic assembly, is the driving unit which connects with the front wheel of the automobile through a flexible shaft, gears and suitable bearings. The other assembly is the speed indicating unit. There is no connection between the driving and the indicating units except the force of magnetism.

There is practically only one moving part in the Warner Auto-Meter. This is the circular magnet made from tungsten steel. Below are the double ball-bearings on which the magnet revolves. Above is a field ring of soft steel which pulls the lines of force from the magnet towards itself—thus concentrating them. This field ring is supported by three bimetallic, or compensator, bars. These are made of soft brass and steel. The changes of temperature from hot to cold, or vice versa, warp or swell these bars. This action raises or lowers the field ring, and thus changes the magnetic field so that it counteracts the effect of the temperature changes on the hair-spring. The speed dial scale of aluminum, coming between the magnet and the field ring, is deflected or moved by the influence of the lines of force a distance in exact ratio to the speed of the magnet.



Mechanism of Warner Auto-Meter

This speed dial is in the form of a cup with the speed figures engraved on its rim. This dial is fixed to a chronometer pivot on which it turns. To this pivot is attached a hair-spring which resists the pull of the magnet on the speed dial, and returns it to zero when the car stops moving. The dial, complete with pivot and hair-spring, weighs only 106 grains, which explains in part why the speed dial is steady and unwavering. This pivot is mounted in extra heavy double bearings of sapphire jewels. The end of the pivot is rounded so that the bearing surface is a dot.



Jones clock combination

Jones—The Jones speedometer, marketed by the H. W. Johns-Manville Co., New York, is produced in a wide variety of models and sizes. All are of the centrifugal type. A heavy brass ring swings freely on fixed pivots mounted on a spindle. When this spindle is rotated by the flexible shaft, centrifugal force causes the ring to tend to take up a position at right angles to the spindle. In doing so, the ring operates a cam movement which in turn moves the indicating hand to the correct position on the dial. The odometer portion is designed to register either forward or backward travel and permits the instrument to be operated by either wheel.

Two exclusive features are the instantaneous trip reset and the maximum speed hand, which stays at the figure representing the highest speed attained until released, at which it returns to the same point as the primary hand which indicates in the ordinary way. Various combinations with clocks are offered, the prices of the different models ranging from $20 to $120. The Jones recorder is an autographic speedometer combination for trucks and makes a permanent record on a paper dial of all speeds and stops of the vehicle to which it is attached.

Van Sicklen—The Van Speed-Meter, made by the Van Sicklen Co., Aurora, Ill., ford Ford cars, is a new model, and made this year for the first time. Other interesting features are a new swivel drive to the front axle spindle of the Ford and a back-of-the-gearset drive by a stamped worm, as used in the Munroe. The most unique feature of the Van Sicklen instrument is the new black-faced dial with internal lighting.

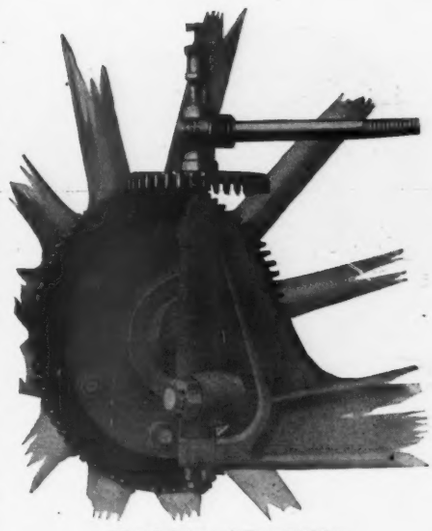
The Van Sicklen instrument differs from all others in that the operating medium is air instead of centrifugal force, magnetism or a liquid. The calibrating device

Van Sicklen flush type

consists of a cup, marked on the outside with the miles-per-hour figures and revolving on a jeweled spindle. This cup carries a small vane and is retained at zero when at rest by a fine hair spring. A pair of spiral parallel gears, acting somewhat on the principle of a gear pump, but not inducing any appreciable pressure, create a slight draft within the casing.

The reaction of this draft, which, of course, is proportional to the speed of the driving shaft of the instrument, upon the vane in the calibration cup, causes it to move, carrying the cup with it, against the tension of the spring, and so to bring the miles-per-hour figures successively into view through an aperture in the dial. The Ford model sells for $12. Another instrument, the type B, sells for $15.

American-Magnetic—The latest addition to speedometers and their fittings made by the American-Ever Ready Works, New York, is a new vanadium steel flexible shaft, which replaces the stranded piano wire shaft formerly employed. A new type of speedometer is a special Ford design of American-Magnetic which has Veeder odometers instead of the white metal numerical odometer rollers as furnished with the standard line. No changes have been made in the older models.



Novel drive of Van Sicklen

As the name implies, the American-Magnetic speedometer operates on the magnetic principle. Special magnets, having unusual strength, it is claimed, make it possible to build an instrument which has a steady hand and yet is sensitive to slight variations in speed. One feature of this design is that the flexible shaft revolves about four times as rapidly as that in the average magnetic speedometer. The speed is reduced by gears in the head of the instrument. Thus, the vibrations of the road wheel, the sudden turning of corners, the jars due to uneven roads, it is claimed, affect the steadiness of the revolutions of the shaft only one-quarter as much as ordinarily is the case. These speedometers are produced in different sizes and clock combinations and are listed at from $12.50 to $40.

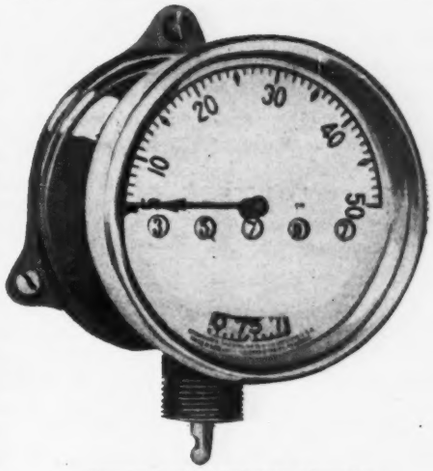
Standard—Standard speedometers of the Standard Thermometer Co., Boston, Mass.,

American clock combination

have been added to, for 1915, by the introduction of a special Ford model. This model is used on Ford cars shipped from the factory as special equipment, bearing the Ford trademark, but has not this trademark when sold through dealers. It incorporates some features of design new to this line, but the action is centrifugal, the governor on the Standard differing from others in that the equal spacing of the calibrations is secured, not through a cam action, but by a rack-and-pinion toggle action, which is said to be proof against wear.

Another feature is the trip odometer, which is a disk back of the dial, and showing through an aperture at the lower portion. This dial may be reset to any desired speed to correspond with the trip mileage in the Blue Book, when picking up a route. It sells for $12.

Hoffecker, Hoffecker Co., Boston, Mass.—Hoffecker-Evans speedometer-speedlock instruments are changed this year from former models. Last year the speedlock served to interrupt the ignition when the speed exceeded a predetermined maximum.

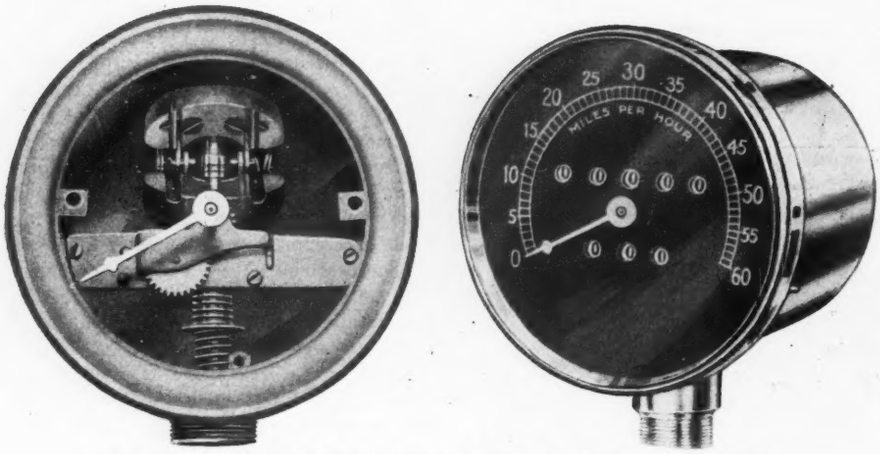


Standard with disk trip odometer

This year, however, the speedlock acts on the throttle control rod.

It consists of a divided throttle control rod, connected by a cylindrical casing attached to that portion leading to the accelerator or throttle lever. The part attached to the carbureter slides loosely in the casing. Within the casing is a pawl which acts on a slot in the latter rod, and is released electro-magnetically. The speedlock is a Yale-locked contact, operated by the speedometer which may be adjusted to make the circuit at any desired speed or at zero.

When this speed is not exceeded, the throttle may be operated as usual, with no interference. When it is exceeded, the speedlock makes the contact, completes the circuit, energizes the magnet, releases the pawl, and sets the carbureter connection free, so that a light spring may slowly close the throttle. When the vehicle speed is again reduced to below the set maximum, the circuit is broken and the pawl engages the throttle rod and



Interior and exterior of Corbin-Brown, showing actuating mechanism at left

operation is resumed as normally. With the indicator set at zero and the key removed from the lock, it is impossible to operate the vehicle under its own power at any speed.

The Hoffecker speedometer proper is of the centrifugal type, with a hand-indicated 100-mile trip odometer and the usual wheel type of season odometer. In addition to the front-wheel drive, the Hoffecker company has brought out two new transmission drives.

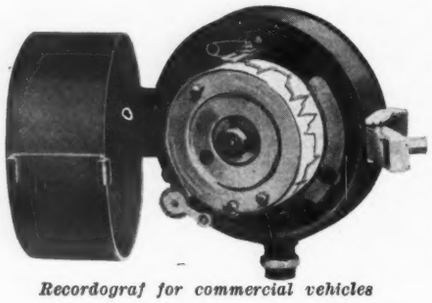
Regular models sell for $50 and $75, with an additional charge of $25 for the speedlock. For trucks, the speedlock is offered, attached to the driving shaft, for $50, or with the speedometer for $75. Waltham clock combinations, one of which has the Packard shape, sell for $100 and $125.

Corbin-Brown—Corbin Screw Corp., New Britain, Conn., produces centrifugal speedometers for 1915 with a new feature, a selective trip reset on the odometer by which it is possible to set the trip wheels at any mileage, so as to pick up a Blue Book route at any point. Another point of interest is the arrangement of the trip odometer wheels on the same spindle as the season wheels, grouping the odometer altogether at the bottom of the instrument, leaving a clean dial above for the speedometer.

They are made in both black figures on a white dial and white letters on a black dial. Corbin speedometers range in price from $25 to $80, in both bracket and flush types, and in combination with Chelsea clocks, at from $65 to $120.

Garford—Formerly Elyria-Dean speedometers, Garford speedometers, made by the Garford Mfg. Co., Elyria, O., are little changed from last season with the exception that several new flush types have been brought out, the trip reset is this year of the selective pattern, and a new Ford type, selling for $12.50, has been brought out. The Garford speedometer is of the centrifugal type, but differs from others of its kind in that the active members are free balls instead of fixed weights, acting through a sliding cone instead of toggle-arms. The Garford is made both in white on black and black on white, and has its odometer wheels all on the same spindle. A special fitting for Ford cars is provided.

Veeder—Odometers and tachodometers of the Veeder Mfg. Co., Hartford, Conn., have not undergone noticeable changes from last season. The feature of the line is the tachodometer, a fluid speedometer with an odometer attachment. It consists of a



Recordograf for commercial vehicles

glass tube similar to that of a thermometer, placed on a curved metal dial, calibrated in miles per hour. At the base of the instrument is a pressure pump which circulates a red fluid. As the pressure is proportional to the speed at which the pump operates, as driven from the flexible shaft from the front wheel, the fluid rises in the glass tube against the influence of gravity and whatever pressure there may be in the tube and indicates the speed.

Transimeter and Recordograf—A hub odometer designed specially for use on trucks is produced by the American Taximeter Co., New York. This is called the Transimeter and made its first appearance at the New York show, though it has been in service for some time. It is presented in four different types, the most notable of which is the Dreadnaught, which is designed to be indestructible.

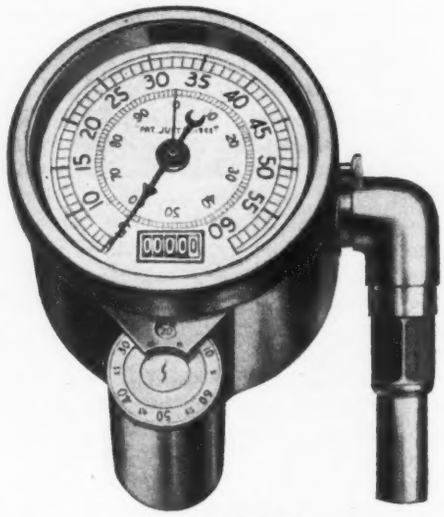
The recording mechanism of this one is contained in a very heavy steel casting, which gives a protection from collision to such an extent that the manufacturer guarantees the instrument against destruction from this cause. The mileage record is contained in the center of the hub cap and is protected by glass covering. It replaces entirely the hub cap and the mileage record remains stationary, that is, it does not revolve with the hub. The Transimeter ranges in price from $16.50 to $25, and attachment is made by inserting a small spring pin in the end of the spindle.

An autographic tape recorder, called the Recordograf, also is manufactured by this concern. The record produced by this instrument is given forth on a paper tape upon which is automatically recorded the time, distance, speed and stops of the vehicle to which it is attached. This provides a positive check upon the vehicle and its driver. The instrument is attached with a collar and star type of transmission to the front wheel and all of the parts are slow moving, the flexible shaft rotating only sixty times per mile. The apparatus is made tamper-proof by a special lock. The instrument, together with a year's supply of tapes, lists at $60.00.

In addition to these two instruments the regular lines of taximeters are continued. One of these is the Jones and the other the Popp.

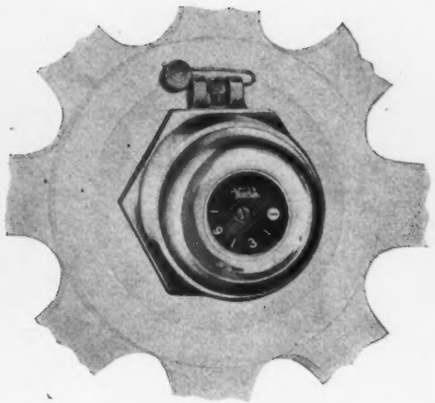
Brown Trafilog—An instrument which is dependent upon vibration only for telling when a truck has stopped, how long it stopped, etc., is offered by the Brown Trafilog Co., Cleveland, O. The feature of

Garford with hand indicator



Hoffecker-Speedlock

Dreadnaught transimeter



Veeder hub odometer

this machine is that it is not visible and may be placed under the seat or in any part of the car where the driver is not likely to find it. It is locked securely and by means of a pencil curve plotted on a chart, it tells the time of stops and the length of time the truck was inoperative. It tells also whether the motor was stopped and gives the owner an idea of the efficiency of his drivers.

Clocks, Trunks and Seat Covers

WALTHAM Truck Clocks—The feature of this year's extensive line of motor car chronometers manufactured by the Waltham Watch Co., Waltham, Mass., is a special truck clock, known as model T. This clock is guaranteed to keep accurate time no matter how rough usage it receives and the maker claims that it is both theft and waterproof. The driver cannot change the time on the clock unless supplied with a key, since the setting mechanism automatically locks when the instrument is attached to the dash. This clock is finished in black enamel, brass or nickle, and sells for $25. The company's output also includes several types of clocks for passenger cars, constructed to withstand vibration and to be set flush with the dash, as well as a limousine watch, which is equipped with a winding indicator that gives notice that the movement should be wound 3 days in advance of its running down, or at the end of 7 days, since the movement runs 10 days without winding. The watch comes in leather cases of three kinds and the price for each is as follows: Morocco, $30; glazed leather, $35, and lizard, $38.

Warner Electric Clock—The newest accessory of the Stewart-Warner Speedometer Corp., of Chicago, is the 1-year self-winding electric clock. The clock is of the flush type and is designed to be countersunk into the dash. It carries a small dry battery at the back and is a standard chronometer, but having a very short coil spring. A contact maker closes the battery circuit once every 2 minutes, the current energizing a magnet whose armature rewinds the spring. The clock requires no attention whatever, it is claimed, except the renewal of the battery once a year. It sells for $15.

Triumph Auto Clock—The Metal Stamping Co., Long Island City, N. Y., is the manufacturer of this chronometer which sells for $2.50 and is finished either in polished brass, nickel plate or black enamel, with brass or nickel rim.

Quick Action Watch Holder—An accessory which sells for fifty cents, but which, combined with a watch, takes the place of a dash clock is the Quick Action watch holder, manufactured by Henry T. Adams & Co., Chicago. This device fastens to the control quadrant, either in the center or at one side, and by removing the clamp, can be screwed to the dash. Hour and minute indicators, which can be set instantly by pressing down the watch, cost 10 cents extra.

TRUNKS

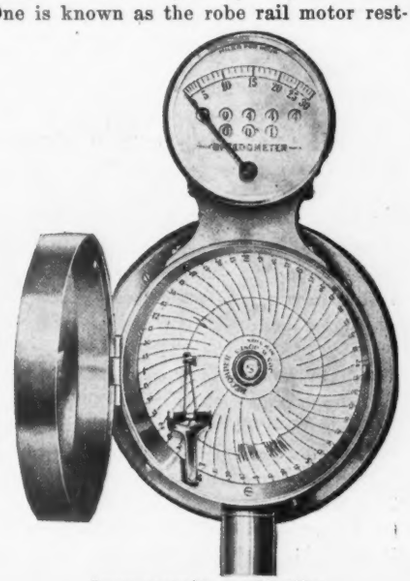
Berg Luggage Carriers—Two innovations feature the extensive line of trunks and luggage carriers manufactured by the Berg Auto Trunk and Specialty Co., New York. One is known as the robe rail motor restaurant and is a large lunch box, carried inside the car under the robe rail, which can be converted into a table by opening the top and extending the folding legs. There are plates, cups, knives and forks for six persons as well as two large boxes for carrying food and space for carrying 1-quart vacuum bottles which are held in place by patent spring devices. The price of this accessory is $30. The other novelty is a moter tea set, a dust and waterproof trunk containing four china cups and saucers, four nickel-plated boxes for holding tea, sugar and crackers, four teaspoons, four napkins, two bottles for liquids, a nickel-plated tea pot with alcohol lamp. The price is $25. The company also makes a line of hat boxes, trunks, suit cases and vacuum bottle carriers.

Ajax Auto Trunks—Trunks of special size and design, to fit the running boards of motor cars, are the novel offering of the Ajax Trunk and Sample Case Co., New York. Luggage carriers for the following machines are advertised: Ford, Overland, Buick, Chevrolet, Cadillac, Dodge, Mitchell, Maxwell, Studebaker, Oakland, Hudson, Chalmers, Cole, Winton, Locomobile, Peerless and Packard are announced. Trunks especially adapted for the rear decks of roadsters also are advertised.

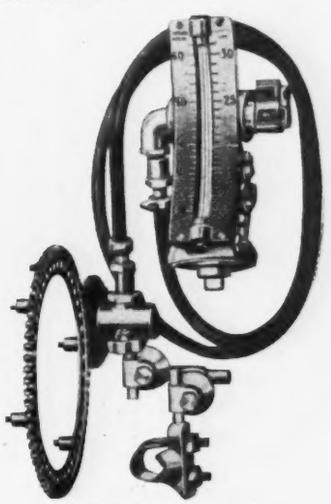
SEAT COVERS

Campbell Seat Covers—The Perkins-Campbell Co., of Cincinnati, O., is manufacturing for the 1915 season all sizes of seat covers in the following materials and colors: waterproof jeans, brown; mohair, brown or black and white; motor cloth, dark and light tan; "Cleanezy," grey and white or brown and white; X. L. woolen, grey and black or grey and brown. With the exception of mohair, the materials all are claimed to be waterproof. The prices vary according to the material used and the make of car for which the covers are intended.

Globe Seat Covers—The Globe Seat Cover Co., Racine, Wis., devotes itself exclusively to protective coverings for motor car seats. Special types for all makes of cars are featured.



Jones recorder combination



Veeder dash tachometer

Tires and Tire Supplies

GREATER use of non-skid treads and a more reasonable selling price are the only noticeable movements in the field of motor car tires, few makers having made any changes whatever in the design or construction of their tires. The market at present shows a varied number of types, including wrapped tread, moulded tread, cord tires, tires with cables or wire running through the bead, steel tread tires, etc.

U. S.—The United States Tire Co., New York, continues to feature its Nobby and Chain tread casings, these coming through for 1915 without change. Besides these tires, the company markets a plain-tread type and a full line of inner tubes, inner liners, boots and tire sundries, such as vulcanizing outfits, patches, etc.

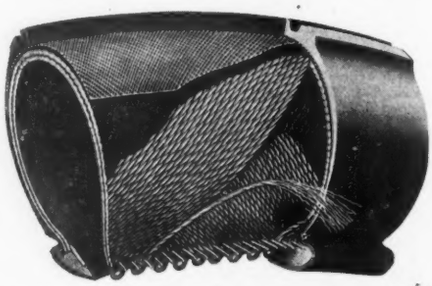
The Nobby tread and Chain tread tires have been on the market for some time, the former having a surface composed of a number of knobs, or thick projections, arranged in staggered fashion, and the latter a rugged surface composed of a number of rubber links arranged to resemble a chain.

Nassau—Nassau tires, made by the Thermoid Rubber Co., Trenton, N. J., appear for 1915 without change. This make is produced in both plain and non-skid types, the latter being shown herewith as having a tread containing a number of angular depressions running out from the center of the tread, which is smooth. This construction allows the edges of the depressions to get a firm grip on the road should the car attempt to side-skid. Also when the tire is in use the sharp lines of the depression allow of good traction being gained. These casings are made in clincher, Q. D. clincher and straight side types and the prices of the non-skid range from $19.47 for the 30 by 3½ to $51.90 for the 37 by 5. A line of gray inner tubes also is carried and the prices of these are $3.75 for the 30 by 3½ to $8.30 for the 37 by 5.

Goodrich—The line of tires of the B. F. Goodrich Co., Akron, O., consists of nine types of tires for motor cars, trucks and electric vehicles. The Silvertown cord tire is a greater Goodrich feature than ever before, dividing honors with the Safety tread. Aside from these two the concern offers the Bailey tread, metal-stud tread, plain tread, cord type for electrics and pneumatic truck casings, all of which are made by the single-mould or unit-moulded process. The Safety tread is a well-known design consisting of five vertical bars intersected by another at the middle and at right angles.

The Safety and Bailey tread tires range in price from $18.10 for the 32 by 3½ to $44.45 for the 37 by 5.

The Goodrich Silvertown cord tire, shown above, differs from the conventional form in that it used a special cord instead of a fabric for the carcass. The latter consists of two layers of rubber-covered, impregnated cords, laid at even tension. Silvertown cord prices range from $36.25 for the 32 by 4 inch size to $57.90 for the 37 by 5, these prices being for the ribbed tread.



Section showing the construction of the Goodrich Silvertown cord tire

Diamond—The Diamond Rubber Co., Akron, O., line consists of the Squeegee tread, which is similar to the Safety described above, and plain treads. All types and sizes are offered with prices ranging from $13.45 for the 32 by 3 to $44.45 for the 37 by 5 non-skid type. Inner tubes and tire supplies also are carried.

Firestone—All types of tires in both plain and non-skid forms and a line of inner tubes are continued by the Firestone Tire & Rubber Co., Akron, O., unchanged for 1915. The Firestone non-skid type still is the lead. It has a tread into which the name non-skid is moulded, the numerous angles produced by this construction, giving a tire which is said to effectively prevent side-sliping and give efficient traction. The Firestone non-skid tire sells for $21.20 in the 32 by 3½ size and $50.50 for the 37 by 5. The concern also markets gray and red tubes and a line of repair outfits and sundries.

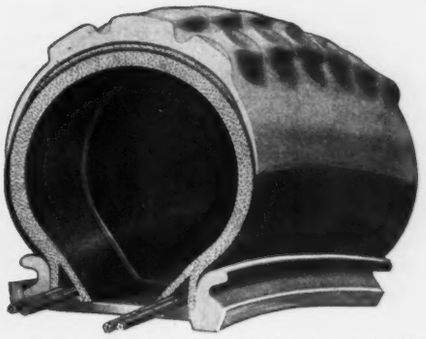
Republic—Republic tires are continued with change for 1915 by the Republic Rubber Co., Youngstown, O. The complete line consists of four tread types, the Staggard, plain, W-M and Staggard electric, together with the Black-line red inner tubes and gray tubes. The W-M tire was brought out last year and has a tread with depressions resembling the letters W and M. It is designed for the lighter type cars and is made in three sizes only, 30 by 3, 30 by 3½ and 32 by 3½. The Staggard tread has been the Republic leader for some time. The Staggard tire sells for $29.75 for the 32 by 3½ and $65.25 for the 37 by 5. The W-M tire sells for $14.15 for the 30 by 3, $18.19 for the 30 by 3½ and $20.45 for the 32 by 3½.

Goodyear—The only change made in the Goodyear line for 1915 has been the addition of some extra-large size pneumatic

Left to right, Swinehart Keaton-tread tire; Hood Arrow tread; Goodrich Safety tread

Left to right, Gaulois, a French make; Lee Zig-Zag; Acme Hemipshere tread

Left to right, Ajax; U. S. Nobby tread; Firestone; Republic Staggard tread; U. S. Chain tread



Showing construction of the Federal double cubic base tire, which has steel cables running through a flexible bead filler

tires for trucks and the changing of the tread of the larger sizes All-Weather type casing. The new truck pneumatics are of the 48 by 12 inch size, the largest ever turned out for practical use. They are made with the All-Weather tread. The change in the regular line of tires has been in enlarging the diamond-shaped projections on the tread. The construction of Goodyear tires is such, it is claimed, that rim cutting is eliminated, the design making use of six flat bands of braided wire in the base, which makes the latter unstretchable. These tires are given a final cure on air bags shaped like inner tubes, this process being effective, it is stated, in preventing blowouts. Goodyear tires are made in plain tread form and in clincher, Q. D. clincher and straight side types. Prices range from $19.60 for the 32 by 3½ nonskid to $49.10 for the same type in 37 by 5 size. A full line of tubes also is carried, together with Power Saver cord tires which have a cord carcass instead of a canvas one.

Swinehart—The Keaton tread continues to be the feature of the pneumatic tires manufactured by the Swinehart Tire & Rubber Co., Akron, O. Besides this type of non-skid casing the concern markets plain tread tires and cellular types, the latter for electric vehicles and commercial cars. Tubes also are carried. In the Keaton tread the non-skid qualities are obtained by a number of depressions in the rubber as shown in an illustration herewith.

Ajax—This is a 5,000-mile guaranteed tire made by the Ajax-Grieb Rubber Co., New York, in two tread types, plain and non-skid, the latter having a tread consisting of a number of diamond-shaped embossings. The spaces between the raised portions are said to exert a suction grip on the road, thus assisting traction.

Kelly-Springfield—The Kelly-Springfield Tire Co., Akron, O., is featuring its Kant-Slip and Bailey treads for 1915, as it did in the year just passed. Aside from these, plain-tread tires are carried and a full line of tubes. The Kant-Slip tire has a tread

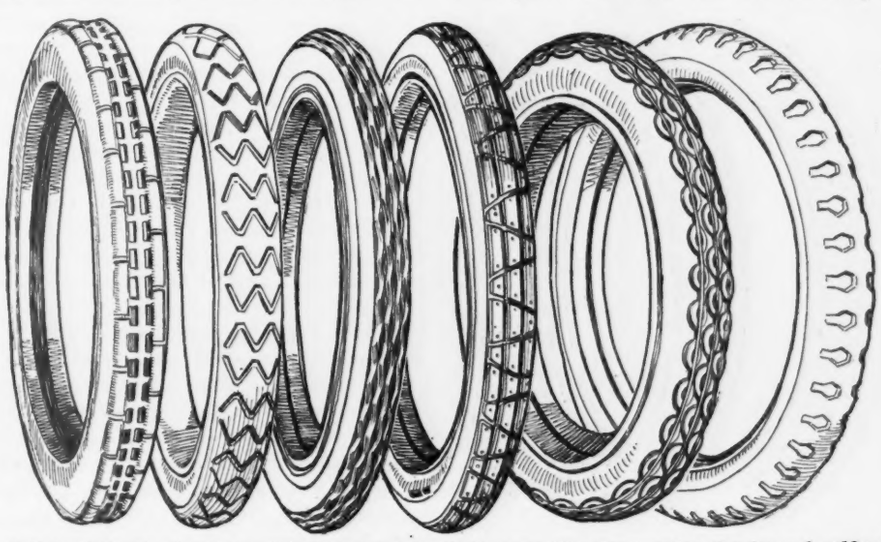
Kelly-Springfield Bailey tread continued unchanged for 1915

consisting of letter X, embossed in the rubber and arranged in two rows divided by a narrow strip of raised rubber. The embossings on one side are not directly opposite those on the other, so that no matter in which direction the wheel skids one or the other or both of the embossings will come into play. The other type of with. Prices range from $32.50 for the non-skid, the Bailey, is illustrated here-30 by 4 Kant-Slip to $57 for the 35 by 5.

Fisk—The Fisk Rubber Co., Chicopee Falls, Mass., offers for 1915 its Red Top non-skid tire, together with plain and other non-skid treads. The Red Top is so-called from the fact the tread is of red rubber with a number of button-like projections, while the rest of the casing is of plain gray material. The Red Top prices range from $19.70 for the 30 by 3½ to $41.75 for the 35 by 4½. A line of tubes, red and gray, also is carried.

Empire—While the Empire Rubber & Tire Co., Trenton, N. J., is marketing both red and gray casings, the latter type are the leaders. Only red tubes are listed with these tires. The Empire non-skid is composed of sets of bars arranged in pyramid fashion, each set facing in the opposite direction from the adjacent one. This tread is shown herewith. All types are furnished both with this non-skid tread and with the plain.

Braender—Featuring a new non-skid tread pattern, the Braender tires made by



Left to right, Mussinan; Republic W-M tread for light cars; Steel-Pneumatic; Empire red rubber casing; Dreadnaught; Nassau

the Braender Rubber & Tire Co., Rutherford, N. J., are offered in plain and non-skid treads and in clincher, quick-detachable and straight-side beads. The new tread is similar to that previously offered, consisting of U-shaped depressions across the tread, but has a number of small cord-like reinforcements in the depression to hold the tread together better and to more evenly distribute the pressure. It is said that the new tread makes a faster tire. Red and gray tubes are carried in all standard sizes. Prices for Braender casings are indicated by those of the 36 by 4 size, which sells for $25.95 in plain treads and $31.15.

Federal—The double-cable base tire with the Federal Rugged tread is taking most of the attention of the Federal Rubber Mfg. Co., Milwaukee, Wis. In each bead of this tire is built two endless cables which are said to be unstretchable. The cables serve to anchor the heel and toe of each bead securely to the rim and they also prevent, it is stated, any chance of the tire blowing off the rim. The bead filler in these casings is a flexible one, composed of twisted strands of cotton, imbedded in soft rubber. The double-cable base is built in all styles and prices range from $18.50 for the 30 by 3½ to $30.35 for the 36 by 4. Plain tread tires, tubes and tire sundries also are carried.

Left, Goodyear All-Weather tread; right, Gordon non-skid

Left to right, Mohawk, Falls, Globe, all of the non-skid type

Pennsylvania—Two tread types are marketed by the Pennsylvania Rubber Co., Jeannette, Pa., both of which are unchanged for 1915. These are the plain tread and the Vacuum Cup, the latter having a tread composed of a number of small cups raised considerably from the rest of the casing. These cups exert a suction grip on the road and thus tend to keep the car from skidding either forward or sideways. The tread is very tough and is claimed to be oilproof. Prices for the Vacuum Cup range from $29.20 for the 30 by 3½ to $54.70 for the 35 by 4½. Red and gray inner tubes also are carried.

Michelin—The Michelin Tire Co., Milltown, N. J., continues its 1914 line unchanged. Two types are marketed, the plain tread and the steel-studded casing, the latter having a leather covering into which the steel studs are fitted. It is made only in one form, soft-bead clincher while the plain tread is offered in clincher, Q. D. clincher and straight-side. Prices are $28 for the plain in 34 by 4 and $38.50 for the steel-studded in the same size.

Miller—The one-cure wrapped tread Cog-Geared tread is the Miller leader for 1915. This tire is made by the Miller Rubber Co., Akron, O., and is carried with a line of plain tires, tubes and a non-skid retread band. The Cog-Geared tire is shown herewith as having a tread containing a number of arrow-shaped depressions in two rows, those of one facing in the opposite direction from the other. Prices for this tire range from $20.10 for the 30 by 3½ to $53.60 for the 37 by 5.

Falls—The Falls Never-Slip casing continues to be the feature of the line of the Falls Rubber Co., Cuyahoga Falls, O. This tire, shown herewith, is made in all types and sizes. The tread consists of embossings so formed that two rows of cups are formed as shown in the illustration. These cups have a suction grip on the road and tend to prevent skidding and also assist in getting good traction.

Gaulois—This is a French-made tire, handled in this country by the Gaulois Tire Corp., New York. It is made in three types, plain, riveted tread and grooved non-skid which is illustrated herewith. The tread of the latter consists of cone-shaped embossings in two rows, the points of the cones facing the beads. Besides the casings a line of red inner tubes are carried.

Hood—The Arrow tread tire is the feature of the line of tires marketed by the Hood Tire Co., Watertown, Mass. The tread of this casing is composed of a number of arrows depressed into the rubber as shown in an illustration herewith.

Mansfield—Three different brands of tires are offered for 1915 by the Mansfield Tire & Rubber Co., Mansfield, O., these being known as the Ohio, Mansfield and Ford special. The Ford type is new for this year. The Mansfield tread, shown herewith is known as the Twin tread and is made in all sizes while the Ford type is made only in 30 by 3 and 30 by 3½. The base of Mansfield tires contains twenty-four steel wires which are designed to keep the tire from blowing off the rim and from preventing rim-cutting.

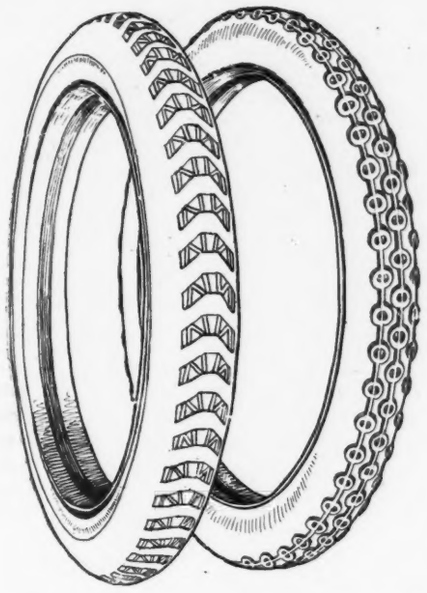
Left, Miller non-skid; right, Brictson with a leather tread fitted with steel studs and rivets

Dayton pneumatic tire now carried with the Dayton Airless

McGraw—The McGraw Tire & Rubber Co. are makers of the Imperial, Congress and Pullman tires, each of which is made in non-skid and plain form. The Congress is the new brand and its tread is shown herewith as consisting of a number of circular rubber projections connected by a rubber strip. There are three rows of rubber knobs.

Globe—This tire, made by the Globe Rubber Tire Mfg. Co., Trenton, N. J., is made in non-skid form as shown herewith, the tread containing a number of diamond-shaped depressions set staggered.

Tyrian—This is the fourth year the Tyer Rubber Co., Andover, Mass., offers its



Left, Braender, a new non-skid for 1915; *right, McGraw non-skid*

Tyrian tires, the non-skid type being illustrated herewith. The tread has depressed into it two rows of the letter T, the cross piece of the letter facing the center of the tread. Besides this tread the concern offers plain-tread tires and a line of inner tubes.

Acme—These tires, made by the Acme Rubber Mfg. Co., Trenton, N. J., are called Red Letter tires by the maker. Two types are marketed, the plain and the Hemisphere tread, the latter having a surface showing a number of hemispheres arranged in three rows as shown in the ilustration herewith. Red inner tubes also are carried. Tire prices range from $19 for the 30 by 3½ to $47.70 for the 35 by 5.

Lee—The Lee Tire & Rubber Co., Conshohocken, Pa., offers its plain, and non-skid tires unchanged for 1915. The feature is the puncture-proof construction in which a number of steel disks are imbedded in the tire between the tread and the carcass. These disks divert the course of any sharp object and thus save the tube from puncture, it is claimed. The Lee Zig-Zag tread is continued and is shown herewith. The Lee company states that it uses the metal vanadium in its tires to make the rubber tougher and so able to withstand hard usage.

Prowodnik—The two different styles of the imported Prowodnik tires are the Columb tread or reverse herringbone non-skid pattern and the steel-studded non-skid pattern, the studs in the latter being imbedded in such a way as to eliminate all possibility of their pulling out or working loose, it is claimed. No leather strip is used for sinking the studs.

In the Prowodnik Columb tread the rubber rib in the center of the tread is at right angles to the tendency to skid. Each of the side ribs, set at an angle of approximately 45 degrees, reinforces and increases the effect of the central rib. Every portion of the tread as it comes in contact with the roadway automatically opposes an effectual resistance to any lateral motion, it is claimed. By arranging the ribs in groups running alternately in different directions an equally effective force is exerted against either forward or backward slipping. Both side ribs and center rib are prominently raised, reducing danger from punctures. The tires are handled in America by the Columb Tyres Import Co., Inc., New York.

Mohawk—These tires are made in both plain and non-skid form, the latter having a tread composed of X-shaped interconnected embossing, as shown in the illustration herewith. Small cup-like depressions are formed by this construction, these cups having a suction grip on the road and so are said to prevent skidding. The maker is the Mohawk Rubber Co., Akron, O.

Brictson—Brictson tires are made by the Brictson Mfg. Co., Brookings, S. D., and have a tread of leather into which steel studs and rivets are fastened. The tread itself is made up of a layer of leather over which is a layer of fabric and the latter is covered with another leather covering. These tires are guaranteed for 10,000 miles. The concern continues to market its tire read, which is described on another page.

Left, Mansfield, and right, Marathon angle tread

Mussinan—An original type of pneumatic tire which differs radically in the method of supporting the load is manufactured by the Mussinan Tire Co., New York. On the theory that the conventional type of tire places the point of support between two points of pressure, so that the load lines intersect the tread at a point where the latter is not in contact with the road, and that therefore the curved tread of the casing must act as a beam to support the weight of the car, the inventor of this tire has increased the points of support to two and moved them to coincidence with the beads of the tire so that they are in the load lines, the space between being an arch.

Gordon—The feature of the Gordon line, made by the Ireland Rubber Co., New York, is the Gordon Triangle tread casing. This is a non-skid design with a triangle-shaped raised pattern, which is said to present surfaces facing three directions, and to distribute the strains over a large tread surface. Prices are $30 for plain tread, 36 by 4 casings, or $33.50 for the non-skid patterns, with other sizes in proportion. The tubes for this size are $6.44 for the gray and $7.15 for the red gum type.

Dayton—Featuring a new pneumatic tire, the Dayton Rubber Mfg. Co., Dayton, O., is continuing the Dayton airless tire as before. The pneumatic product has only been on the market a few months, although the airless design has been on the market for 8 years and largely is used on fire apparatus. The pneumatic tire is not radically different from standard makes, having a non-skid tread patterned to resemble lacing. They are guaranteed for 5,000 miles, and are made in quick-detachable clincher forms only.

Steel-Pneumatic—A puncture and blow-out-proof pneumatic tire that is self-inflating and that adjusts its pressure to the load is the novelty exhibited by the Steel Pneumatic Tube & Tire Co., New York. The tire consists of a tube or core composed of a hard rubber body with a number of steel pistons working in cylinders. These cylinders also contain air pumps operated by the pistons. The casing of the tire is similar to the ordinary type except that the tread is reinforced inside and that it is attached to a special rim in a different manner from that customary.

Double-Fabric—Featuring a new inner tube made of six plies of rubber, alternate layers of red and gray gum, which is said to combine the good features of both compounds with the faults of neither, and a new type of adjustable hook-on tire boot, the Double-Fabric Tire Co., Auburn, Ind.,

Left, Tyrian tread, and right, Pennsylvania Vacuum Cup

markets a varied line of rubber accessories. The new tube is called the Double Rubber tube, and is said to be 50 per cent thicker than standard tubes. In addition to this tube, straight red and gray tubes are carried. The Interlock inner tube, a fabric sleeve which goes between the tube and the casing is a product which this concern has marketed for some time.

Dreadnaught and Dixie—Featuring a new line of medium-grade tires with plain or non-skid treads optional at the same price, under the name of Dixie, the Rubber Tire & Accessories Co., New York, maker of Dreadnaught tires, continues its 5,000-mile line of tires under the latter name, and Greenburg inner tubes. Dixie tires are guaranteed for 3,500 miles, and have the standard gray tread. They are made in regular clincher, quick-detachable and straight-side types, and special red and gray inner tubes are carried in this line. Prices are $25.95 for a 36 by 4 casing, $5.75 for a red tube of the same size, and $5.20 for a gray.

Marathon—The Marathon Tire & Rubber Co., Cuyahoga Falls, O., features a new angle tread non-skid, consisting of a number of V-shaped rubber projections distributed evenly over the tread at varying angles. Both smooth-tread and angle-tread casings are available in all sizes, clincher and quick-detachable beads only being carried. Both red and gray tubes are carried. Prices on casings are represented by those for the 36 by 4 size, which are $31 for plain tread and $36.80 for angle tread.

Brown Tube—The Brown Scientist Tube Co., New York, continues to market the Brown scientific inner tube, which is said to be puncture-proof. It really is an extra heavy tube turned inside out and if a hole is made by a piercing object the tendency is for it to close up immediately.

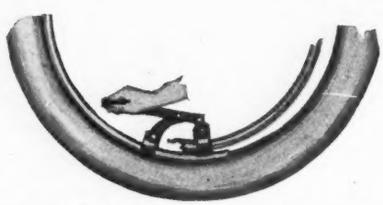
Latest type Woodworth tire tread

Tire Treads, Tools and Repair Outfits

LEATHER Tire Goods Co., Niagara Falls, N. Y., is making Woodworth treads and boots, the feature being the new ventilated treads with rubber and steel-studded non-skid surfaces. These treads are of rubber and tire fabric instead of leather as the regular styles are, and cover only the tread of the tire. They are secured by metal straps which connect the tread strip with the spring rings at the rim which hold the tread to the wheels. One model of these treads is fitted with rubber studs and the other with metal ones. Prices are indicated by those of the 36 by 4 size, which, in the ventilated rubber tread, are priced at $16, in the steel-studded ventilated rubber type at $17.75.

Hick-Myer Rim Tool—Difficulties sometimes encountered in changing tires on transversely split rims has resulted in the production of several special tools adapted to assist in withdrawing or replacing the rim. The Hick-Myer Rim Tool operates on the toggle joint principle and provides a very much increased leverage for telescoping or expanding the rim. A special type is provided for Overland, Studebaker, Chalmers, Mitchell, Dodge, Hudson, Reo,

Stanweld tool for demountable rims



Hick-Meyer tool for transversally-split rims

Off-and-On tire tool

Regal, King, Hupmobile, Westcott and Jeffery cars. It retails for $2.50 and is made by the Toledo Auto Tool Co., Toledo, O.

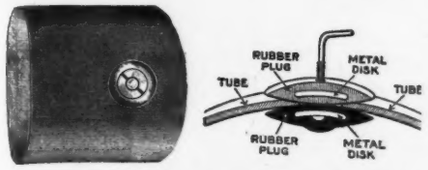
Standard Welding Co.—Standard Welding Co., Cleveland, O., has produced a very light and simple tool for contracting and expanding transversely split demountable rims. It weighs less than 11 pounds and can be collapsed into a package 9 by 5 inches in size. It costs $1 and can be fitted to nearly all type of these rims of any size and either straight side or clincher. It operates on the turnbuckle principle and the ends are drawn together or expanded simply by shortening the shank by means of the turnbuckle.

Kimball Tire Case—A steel armour plate or protector for casings is made by the Kimball Tire Case Co., Council Bluffs, Ia. It is designed to prevent skidding, blowouts, and rim cuts. Each section is 2 inches wide and ⅛ inch thick and hooks to the rim.

Weed Chains—Anti-skid tire chains continue with little change as the product of the Weed Chain Tire Grip Co., Bridgeport, Conn. The object of the chain is to afford friction surface between tire and road without affecting the tire.

Sampson Repair Plugs—A novelty in tire repair outfits made its appearance at the New York show in the form of a plug to provide a permanent repair for puncture, without the use of cement or gasoline or, in fact, without even cleaning the tube. The plug is the invention of R. W. Sampson, originator of the Sampson-Schrader tire valve. The same screw principle is used as that utilized to fasten a valve stem in the inner tube, the two halves of the plug providing a soft rubber surface over a metallic disk. The rubber being soft enough to mushroom at the edge of the upper part of the plug which comes in contact with the casing, the plug is flattened out by the pressure until it is very thin. The feature of the device is the feathering or mushrooming of the soft rubber edge of the plug to prevent chafing the tube. A tool is supplied with the kit to cut a clean hole around the puncture and then to distend this hole in the tube for the insertion of the plug. The latter is then screwed up tight and the screw handle broken off below the surface of the rubber. This plug was brought out last season in England by Brown Brothers, of London, but is being marketed in America by Stevens & Co., New York.

Spitler Puncture Plugs—Another type of tire repair plugs is the puncture plug made by B. W. Spitler, Dorchester, Mass. These are intended to repair punctures without the use of cement or vulcanizing and consist of a disk with a threaded center pin which is slipped into the puncture from one side. Over the threaded portion is slipped a cap which covers the other side of the tube. A lock nut is then screwed over the threaded pin by means of a small key and tightened to prevent leakage. The feature of the plug is that it can be used over as many times as desired. These sell



Spliter tire plug which needs no cement

at 75 cents and $1 per set of four, depending on the size.

Legnard Tire Rebuilder—An inner liner called the Legnard Everlasting Rebuilder is manufactured by A. B. Legnard & Co., Waukegan, Ill., for whom the Stewart Auto Accessories Co., Chicago, is the distributor. It is made of a special tanned chrome leather in which the leather is treated with asbestos and rubber to make it a nonconductor of heat. The rebuilder is guaranteed against blowouts for 5,000 miles and will outwear two outer casings, it is said. A 34 by 4 rebuilder lists at $6.50. Other tire goods include blowout shoes.

Gilbert Tire Covers.—Not a tire repairer but a preventer of the same is the Gilbert tire cover, made by the Gilbert Tire Cover Co., New Haven, Conn. These are designed to protect spare casings from the effects of water and dust. They are made in all sizes and styles.

Jiffy Automatic Patch—The Johnstown Rubber Co., Johnstown, Pa., is manufacturing a patch in sheet form large enough to make fifty good-sized tube repairs. It has the plastic material already attached to the rubber and faced with a non-adhesive protector so that no application of cement and no vulcanization is necessary. The automatic patch sells at $1 per can. Another Jiffy tire supply is the Shoe-Mend. This is a plastic rubber compound designed to fill small cuts and holes in casings. It hardens in a few minutes without vulcanization. It also may be used for repairing punctures. This sells for $1 per can.

K. C. No-Stretch Boots—The Western Tire and Rubber Co., Kansas City, Mo., is manufacturing a line of blowout boots and inside patches under the name of K. C. No-Stretch. The outside boots are made of steel studded leather and tire fabric. They have hooks which fit under the clinching ring.

Voorhees Tire Supplies—The line of tire supplies of the Voorhees Rubber Mfg. Co., Jersey City, N. J., is featured by the Ideal red tubes. These are characterized by being constructed on the multiple-laminated plan; that is, they are made of a number of thin laminations, thus preventing any likelihood of their being coarse spots in the tubes. Inner sleeves and outer boots also are offered.

C. O. T. Supplies—Charles O. Tingley & Co., Raleigh, N. C., makes a specialty of tire supplies the chief of which is Tire Solder. This is a self-vulcanizing rubber compound which when dried or cured becomes a hard, elastic rubber approximately of a nature between the inner tube and casing, both of which it resembles. Another supply is Gum-Gum, a filler for deep cuts in casings and put up in 4-ounce tubes.

Double Seal Tire Valve—Announcement has been made of the formation of the Double Seal Tire Valve Co., Inc., New York. The concern has rights to manufacture and market a double-seal tire valve. This new valve has one strong point in its favor over the single seal valve. With the double seal attachment, leakage is entirely eliminated. The effective strength of the upper seal is reinforced by the lower seal, which is packed beneath the lower collar in the shell.

Newmastic—Newmastic tire filler, a compound of glue and glycerine, is shown in connection with the new steel wheels manufactured by the Hydraulic Pressed Steel Co. These wheels are of pressed steel with tubular spokes and take a special type of demountable rim which fastens directly to the spokes, no felloe being employed. Newmastic is injected through the valve of the inner tube, just as air is, in the liquid state. A Newmastic-filled tube may be transferred from one casing to another by the aid of clamps.

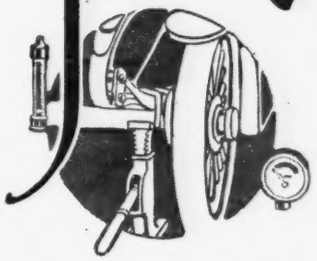
Air-in-All—Woodbridge Chemical Co., New York, makes Air-in-All, a puncture sealer, which is designed to be injected into the tube without interfering with the air in the tube or affecting resiliency. It fills about one-tenth the air space in the tire. It is claimed to be non-injurious and non-deteriorating. Two sizes, the smaller for 30 by 3 and under and the larger for larger tires are carried. In use, the can in which the material comes is connected with the air valve and the contents poured into the tube. The small-sized can costs $1 and the larger $1.25.

Essex Tire Supplies—The Essex Rubber Co., Inc., Trenton, N. J., manufactures a line of tire goods the feature of which is the Essex Red inner tube. Other specialties are blowout patches, inner sleeves and liners and outer hooks of both the hook-on and laced type.

Clincher Tire Plow—A special tool for quick removal and replacement of tires on clincher rims and specially adapted for the Ford is made by the Clincher Tire Plow Co., New York. It is operated by simply inserting a hook under the rim and using the hub and the ground as a leverage. The tire is run off on the rim by rotating the wheel. It is possible to remove and replace a tire in 1 minute, it is claimed.

Magic Clincher Tire Tool—A similar device to the one just described and designed for the same purpose is made by the Max Machine Co., Clinton, Mass. This tool consists of a hook to go around the hub and a standard carrying a head which is inserted between rim and tire. Rotation of the wheel slips the tire on or off as desired. The price is $3. This company also makes the Master tire tool, a hand-operated device which sells for 50 cents.

Tire Gauges and Jacks

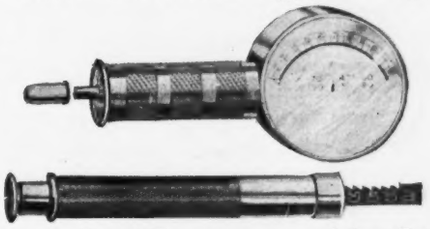


TWITCHELL—The feature of the Twitchell, made by the Twitchell Gauge Co., Chicago, is the lock-stop, which enables the driver to learn the air pressure without difficulty. The internal mechanism consists of a heavy piano-wire spring which, forced by the pressure of air in the tire, pushes the indicator bar through the top of the body of the gauge, so that the indicator bar locks at the point of pressure. The Twitchell is of the pencil type so that it may be carried easily in the pocket; it is easy to read because the indicator is a flat bar with large black figures on a black background. It may be operated from any angle. It lists at $1.

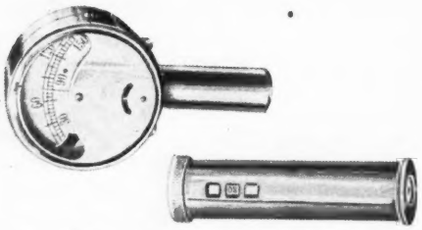
Invincible—In shape, the Invincible, made by the United States Gauge Co., New York city, resembles a watch and it may be carried in the pocket like a timepiece. A hand sweeps around the dial, stopping at the figures which indicate the air pressure of the tire being tested. The internal principle of this device is the Bourdon spring. The list price is $1.25.

Improved—The improved Gauge Mfg. Co., Syracuse, N. Y., believes in the dial type of air gauge and its improved tire tester is in this category. Indication is obtained by holding the tire testor on the tire valve, the pointer remaining at the tire pressure until moved back to zero by a stud in the cover. The Bourden tube is used in the interior construction.

Stevens—The Stevens Supply and Mfg.



Above, Twitchell pressure gauge; below, the new Stevens



Above, Mayo pressure gauge; below, Eclipse tire gauge

Co., Chicago, has a new type of pressure gauge which is adjustable, so as to make corrections for changes in spring tension. This gives the gauge the feature of reading accurately throughout its life, provided the tension of the spring is altered when required. Another feature is that the reading is not lost after the gauge is removed from the tire valve. The Stevens sells for $2.25.

Schrader—One of the pioneers in this branch of the industry is A. Schrader's Son, Inc., Brooklyn, N. Y., making the Schrader universal tire pressure gauge, which contains a large air chamber, which has only one opening. This is at the bottom at the point where the gauge is held to the tire valve. During the operation of testing the air pressure, the air chamber of the tire and the air chamber of the gauge become one continuous chamber. When the contact between the valve and the gauge is made, the air enters the air chamber in the gauge and gradually extends it until the exact air pressure in the tire is shown on the indicating sleeve. The indicator remains set at the figure giving this air pressure until pushed back into place. The price is $1. This company also makes a quick-acting dust cap, which requires only a quarter turn to fasten or remove it. This lists at 40 cents. The company also makes a repair tool for valves which does four things—rethreads the valve cap, refinishes the top of the valve stem if necessary, rethreads the inner portion of the valve without removing the valve and removes the valve interior mechanism from the valve proper. This lists at 25 cents.

Allen Tire Gauge—The Allen Auto Specialty Co., of New York, is specializing on only one type of tire pressure gauge during 1915. It works on the common tension spring principle and sells for $1.

Mayo—The Mayo Mfg. Co., Chicago, markets a vest pocket tire tester which registers as high as 150 pounds and lists at $1.25.

Staon—The Staon is one of that type in which the gauge remains on the tire, telling pressures at all times. No change has been been made in its construction, the internal principle utilizing the hollow Bourdon tube to record the pressure inside the tire. It is made by the Advance Specialty Co., Rochester, N. Y., and is sold for $6 for a set of four.

Boyce Motometer—The Boyce Motometer is a well known device which

Schraeder pencil-type gauge

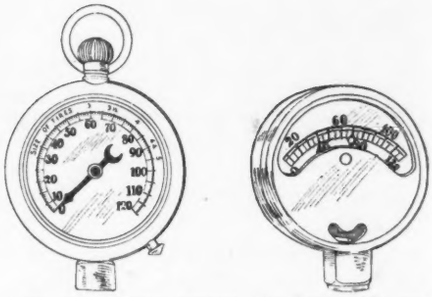
when attached to the radiator cap, tells when the radiator needs water, when the lubricating system needs more oil, when the fan belt breaks or slips and when there is dangerous heat congestion anywhere throughout the car. Really it is a thermometer with a red fluid that tells the whole story. The Motometer Co., New York city, is the maker. The standard model lists at $10; the junior at $5, while a special for Fords is booked at $5.50.

Triumph Magnetic Gasoline Gauge—A device which has been on the market for sometime, is the Magnetic gasoline gauge, manufactured by the Boston Auto Gauge Co., 8 Waltham street, Boston, Mass. This gauge is particularly suited for pressure and vacuum fuel tanks, although it may be used on any tank. It is air-tight because there is no connection except the magnetic one, between the float mechanism and the indicating needle on the gauge dial. The principle is very simple. The needle is made of steel and it is moved by a small steel magnet which is controlled by the position of the float. This gauge is made for all sorts of installations. There is an upright type for installation in the top of a tank, a side gauge which goes in the center of the end, a locker gauge which is for underseat installations but by means of an extension on it the gauge dial is placed at a level with the cushions so that it may be read at any time without going to the trouble of pulling up the cushion.

Rochester Gasoline Gauge—This gauge is made to be inserted in place of the usual filler cap, the indicator cap serving as the filler cap and the indicator automatically engaging in the correct position as the cap is screwed in place. It is not necessary, therefore, to remove the gauge in order to refill the tank. A model for the Ford is featured and sells for $1.50.

Trescot Pocket Meters—In response to a demand for a small pocket meter, the Sterling Mfg. Co., of Cleveland, O., is manufacturing in addition to the Sterling line, the Trescot meters, which are about ½ inch in thickness and ¾ inch in diameter. The dial is printed in white on a black background, but white dials will be furnished if preferred. The Trescott meters are mare in three types, their ranges being as follows: Trescott ammeter, 40 amperes; Trescott voltmeter, 10 volts; volt-ammeter, 40 amperes and 10 volts.

Benford's Monarch Ammeter—An ammeter that its maker, the Benford Mfg. Co., of Mt. Vernon, N. Y., claims is indestructible, is the Monarch, which shows current up to 30 amperes. It can be used



Two watch-type gauges, the Invincible and Improved

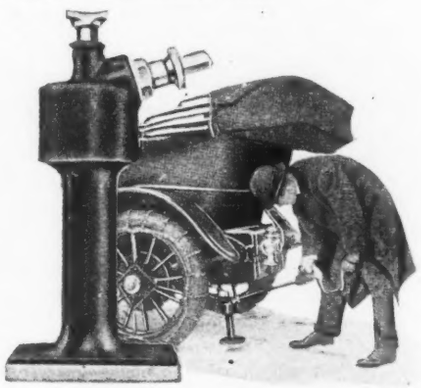
in two ways, either by holding ammeter upright or employing the contact point attached to the gauge. It sells for $1.

Challenge Gasoline Gauge—Another device similar to that described above and designed for use on Ford cars is the Challenge, a filler cap and gasoline gauge combined. It is listed at $2.

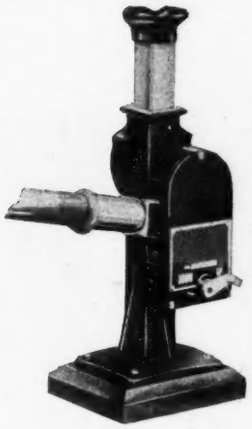
Cesco Voltmeters and Ammeters—The 1915 line of voltmeters and ammeters manufactured by the Chicago Electric Specialties Co., Chicago, have a D'Arsonval movement and the moving part is mounted on a polished steel pivot, the bearing points of which rest on sapphire bearings. They are made in two types, A, reading up to 75 volts or 40 amperes, selling for $10, and B, reading up to 20 amperes, listing at $5. The instruments are made in three models—1, intended for flush mounting; 2, suitable for front mounting on switchboards, etc.; and 3, which has the dial inclined at an angle of 45 degrees when attached to the dash.

TIRE JACKS IN THE FIELD

GEMCO Tire-Saving Jacks—A set of four jacks, made of malleable iron, instantly adjustable to any height hub or axle because of the special rachet construction and with a leather saddle on the hub support to prevent the scratching or marring of the hub are manufactured in three sizes by the Garage Equipment Mfg. Co., Milwaukee, Wis. The regular size for cars weighing less than 3,000 pounds is sold for $6.25 per set of four; the extra heavy size for $8; and the special size for Fords and light machines for $5. This company also makes the Gemco spring spreader, a device to be used to separate the leaves of the springs in lubricating them.



Raiswell jack and how it is used



Hartford jack for 1915

Jiffy-Jax Tire Savers—Solid steel construction, insuring strength and rigidity, and ease of operation, making it possible to lift the most weight with the least muscular exertion, are the points claimed for these jacks which are adjustable to any height from 13¾ to 18⅝ inches. These are manufactured by the Jiffy Jack Co., Cleveland, O., and a set of four sells for $5.

Off-And-On Tire Tool—This device, made by the Stewart Accessories Co., of Detroit, and selling for $1, grips both the hub cap and the rim, with the result that the wheel and tire are removed at a single operation.

The Excel Jack—Capable of lifting heavy cars weighing up to 8,000 pounds, this jack is a garage tool that saves time and labor in getting the machine ready to make repairs. It weighs 50 pounds and has a lifting handle 50 inches in length and a wide, heavy base fitted with rollers for easy handling. So long is the lifting handle that one downward motion of the lever raises the car instantly. The price of this device is $16 and it is made by the Motor Specialties Co., Waltham, Mass.

Raiswell Jack—The feature of this device, made by the Sipp Machine Co., of Paterson, N. J., and listed at $6, is a long-jointed handle, 2½ feet in length, ending in a brace-and-bit style of grip. The long handle obviates any necessity of getting under the car, as the jack can be set in place by its handle. It is operated by a rotary motion of the handle.

Excel jack and how it is used

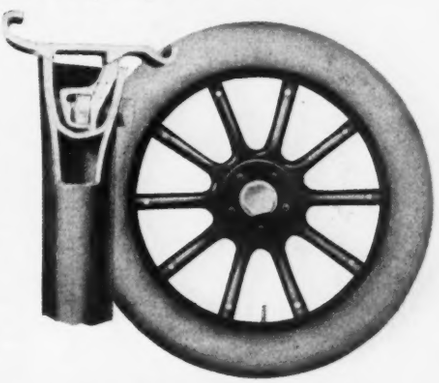
Tire saver

Hartford Jack—Strong construction and ease of operation are claimed for this jack, manufactured by the Hartford Suspension Co., Jersey City, N. J. The manipulation of the handle operates by means of a ratchet, a pinion meshing with a large gear, the movement of the latter being directly communicated to a pinion engaging the rack on the moving upright. The entire mechanism is wholly inclosed in metal castings finished in black enamel. The bearings throughout are of generous size, carefully fitted, and freely lubricated by grease held within the casing. A trip is provided by means of which the action of the ratchet is reversed, so that the load can be either lifted or lowered by the same movement of the handle.

Left, Jiffy-Jax; right, Lane pressed-steel jack

The Standard Welding Co., of Cleveland, O., has introduced for the 1915 season a new rim that departs from past practices. Its chief points of difference are that the side-flanges once applied to a casing remain with it permanently as long as it is used, not being removed in changing tires, that these are not split, and that the felloe band has but one beveled face, that to the rear. The rim is simpler than previous types. It consists of a single felloe band permanently shrunk onto the wheel, the rim, which is beveled on both inside edges, and split, two continuous side flanges, which may be of the clincher or straight-side type, and the split wedge-ring, beveled on the outside only.

Parker Hydraulic Pressed Steel Wheel—Two types of the Parker hydraulic pressed steel wheels are offered by the Hydraulic Pressed Steel Co., of Cleveland, O. No. 1 is for use on small cars of the Ford type and it will take an ordinary one-piece clincher rim and almost any of the transversely-split quick-detachable clincher rims. It is made 30 by 3½ and 31 by 4, the spider weighing 10 pounds. It lists at $25, including one spare rim. No. 2 is for use on the heaviest touring cars and limousines and is interchangeable with the ordinary artillery wooden wheel of the same size, fitting in between the ordinary hub flanges just as does a wooden wheel. It will take hub flanges up to 9 inches.



Parker pressed-steel wheel

Development Rims and Wheels

SCHWARZ Ford Wheels and Rims—The Schwaz Wheel Co., Philadelphia, Pa., has entered the Ford accessory field with a special set of wheels equipped with Funk demountable rims, selling for $25. The company claims as a feature of its product grooved and mortised spokes, which dovetail or interlock, forming a rigid, immovable center assembly that cannot loosen or get out of shape under the most severe strain.

Sewell Cushion Wheel—The Sewell Cushion Wheel Co., Detroit, Mich., builds cushion wheels for motor trucks and passenger cars. Two types are made, the single and the dual. In either type the inside wheel is carried on a series of trusses of rubber, which occupies the space between the wheel and the outer felloe. Rubber side flanges encircle the wheel on both sides and connect the inner and outer felloe, making the space containing the rubber cushion proof against air, dust and grease.

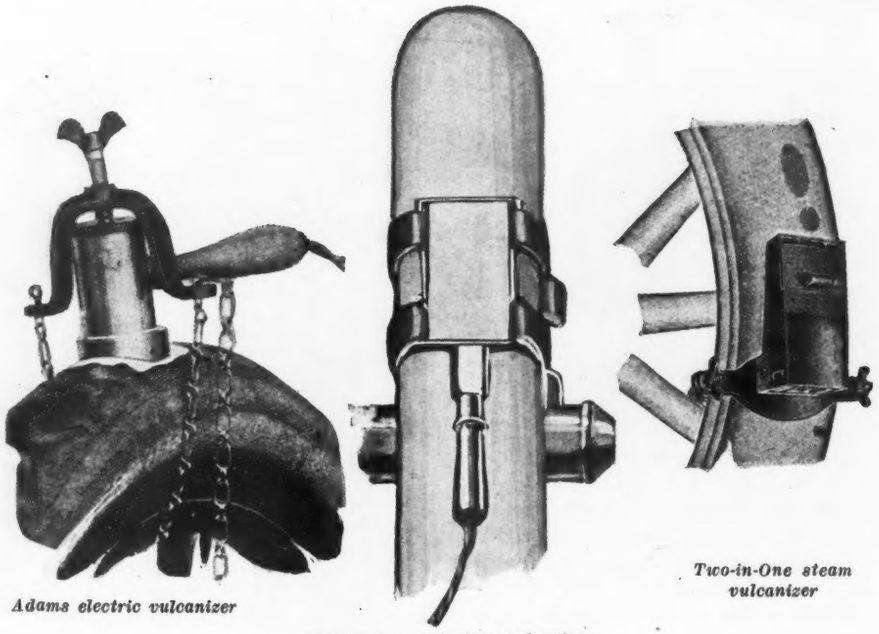
Spranger Wire Wheel—A wire wheel which has the demountable rim feature is being produced by the Spranger Rim and Wheel Co., Detroit, Mich. This wheel comprises a standard form of rim holding the tire, which rim fits onto a steel channel felloe, to which the wire spokes run. A pair of lugs is welded at equally spaced intervals around the inner surface of the rim. There are either three or four sets, depending upon the size. These lugs fit into slots cut in the channel sides of the felloe and make the firm attachment of the two parts.

Stanweld Rims—In addition to a line of wire wheels for Ford cars, made in clincher and detachable rim types and selling for $20 and $27.50 per set respectively, and the line of rims previously manufactured.

Ashley Wire Wheels — Ashley wire wheels, made by Ashley Wire Wheel & Rim Co., New York, and the General Rim Co., Cleveland, O., include the Ashley-Moyer quick-detachable demountable rim. This rim is of the two-piece pattern, the felloe band being provided with a flat face in the back and a beveled face in front. The rim has corresponding faces on its inner surface and a clincher bead. The rim is held to the wheel by a split-ring. The detachable feature consists of a rim construction which permits it to contract. It is split at one point, and the parted ends may be overlapped and drawn in by a single motion of a toggle lever. The rim may be applied to either wood or wire wheels. It is standard on Ashley wire wheels as the carrying of an extra rim obviates the necessity of having an extra wheel along.

Dunlop Wire Wheels—Absolute protection against careless attachment by an automatic lock and strong construction resulting from the use of reinforced steel are the features of the Dunlop detachable wire wheels, manufactured by the Dunlop Wire Wheel Corp. of America, New York.

Houk Wire Wheels—The Houk Mfg. Co., of Buffalo, N. Y., is continuing without any change in construction for the present season the wire wheels manufactured for the past 2 years. The wheels are finished in enamel to correspond with the color of the car, adding to the appearance of the machine.



Adams electric vulcanizer

Two-in-One steam vulcanizer

Westinghouse electric vulcanizer

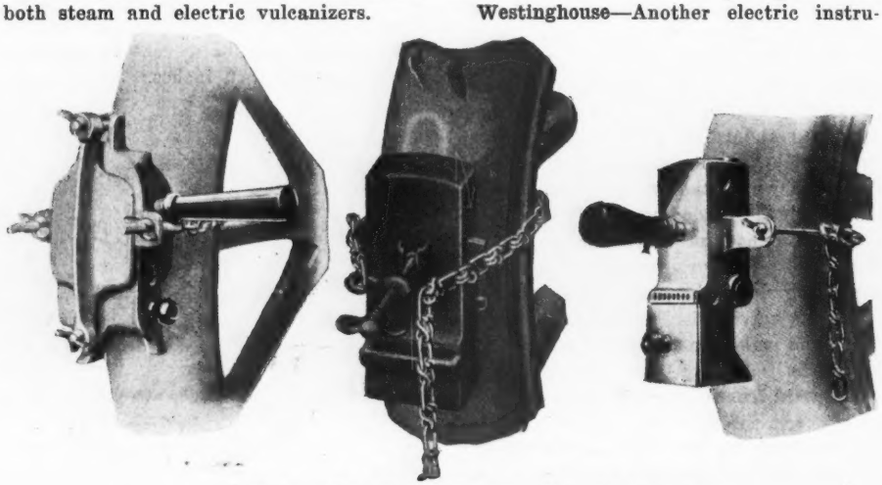
Vulcanizers of Various Types

SHALER—The very complete line of vulcanizers manufactured by C. A. Shaler Co., Waupun, Wis., is featured by the addition of two new models, one called the Tube-Kit which sells at $2 and the other the Ford-Kit especially designed to fit Ford tubes and casings and listing at $2.75. These two operate in the same way, being heated by a lamp which burns either gasoline or alcohol without smoke or exposed flame. A measure furnished with the machine gives a correct fuel charge so that there is no chance of overcuring or undercuring a repair. The fuel is contained in the lamp in such a way that accidental upsetting of the vulcanizer while in use will not cause trouble. In addition to the direct heating type thus described this concern manufactures both steam and electric vulcanizers.

Two-in-One—A novel type of vulcanizer is that made by the Lazarus Mfg. Co., Cleveland, O. This is a steam vulcanizer, but no thermometers or gauges are required. It gets its name from the fact that the instrument can be used for repairing either tubes or casings. It is filled with water at the factory and needs no further attention than the addition of fuel, a proper amount of which is determined by a measuring cup. The instrument with complete outfit sells for $2.

Quick Action—A vulcanizer of the electrip type is made by Henry T. Adams & Co., Chicago. This is designed to be used for either tubes or casings and operates from the lighting system of the car, the ignition generator on a Ford or 110 volt A. C. or D. C. house lighting current.

Westinghouse—Another electric instrument is made by the big electrical firm of Westinghouse Electrical & Mfg. Co., Pittsburgh, Pa. The outfit consists of the vulcanizer, a rheostat for controlling the temperature, a thermometer, a clamping board, for use in repairing inner tubes, two substantial canvas straps for casing repairs on the wheel and 15 feet of flexible cord. The instruments will operate on either A. C. or D. C. current supply of from 110 to 125 volts. The list price is $17.50.



Left to right; Shaler; Marvel; Marvel steam type

Marvel—Marvel steam vulcanizers are of the sealed water-chamber type and are heated by an enclosed flame. One type, the Model A, is for tubes and casings and has vulcanizing surface 1½x3 inches. With complete supplies it sells at $1.80. It is made by the Marvel Auto Supply Co., Cleveland, O.

Brown—The Brown vulcanizer is of the direct heating type and operates on gasoline. The outfit consists of a heating pot, vulcanizing iron, inner tube stand, scissors, rubber, chain and thumb nuts, clamps and measuring cup. Tubes or casings may be vulcanized with this instrument and the 1¼ ounces of fuel is all that is required. It sells for $2 and is made by the Brown Co., Syracuse, N. Y.

Horsey—Horsey Mfg. Co., Cleveland, O., rather appropriately has named its small vulcanizer the "Pony." It is specially constructed to use Horsey No-Cement patches. It is of the direct heating principle, using denatured alcohol as fuel, and the feature of its construction is the fact that a spring tension is provided on the tube during vulcanization. With an outfit of No-Cement patches, sand paper, etc., the instrument sells for $3.

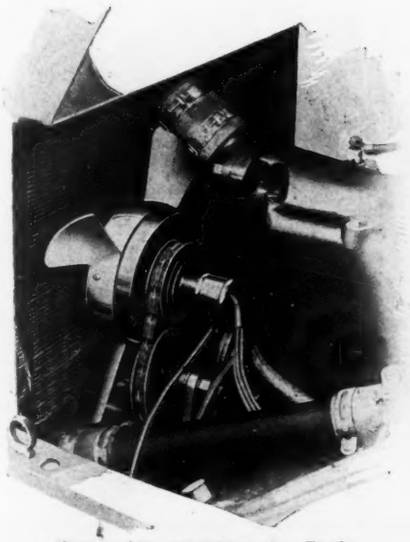
Haywood—The Haywood Tire and Equipment Co., Indianapolis, Ind., is featuring a repair shop vulcanizing outfit and is making a special appeal to those who wish to start in the tire repair business.

Lamps and Lighting

KEMCO Fan-Generator—A lighting generator intended to perform the double function of supplying current for lighting and ignition and also to cool the radiator, is made by the Kemco Electric Mfg. Co., Cleveland, O. The generator proper simply is mounted on the engine in place of the fan and is driven by the fan belt. The outer portion, which revolves, is provided with fan blades so that the cooling is not interfered with. The fact that it is mounted where it is kept most cool permits it to be both light and compact. It is stated that the output is ample for starter, lights, horn, ignition and battery charging. The complete equipment for installation is supplied and attachment requires but a short time. This generator also is used in connection with the Kemco-Ford starting system described on other pages.

Elyria-Dean II—Garford Mfg. Co., Elyria, O., is manufacturing a dynamo lighting system especially adapted for lighting small cars. The system consists of a compact dynamo with self-contained reverse cutout combined lighting switch, current indicator and connecting rack and a 35-ampere-hour battery. The generator output is controlled by a special arrangement of winding so that the regulation is inherent. The dynamo cuts in at 700 r.p.m. of the armature, carries all lights dim at 1,000 and all lights bright at 1,400. The drive ratio is 2 to 1. The system is designed to operate two head lamps and a rear light using a dimming resistance to cut down the brilliancy of the headlight. The system is arranged for easy installation and sells without battery for $35.

Jackson System—Charles A. Jackson Co., Boston, Mass., is manufacturing a lighting outfit designed for easy equipment to cars in service at a low cost. The generator is arranged to be driven by any convenient means, but this concern makes a feature of its porcupine drive, which consists of spurs or quills projecting from the face of the governor pulley and a belt punched with holes which register with the quills. It gives 8 amperes and 7 volts and the regulation is supplied by a mechanical governor. Reverse current is prevented by an electro-magnetic cutout. The generator alone sells at $15. A special Ford outfit is provided complete for $31.



Kemco fan generator for Fords

Eureka—This is an outfit especially designed for small cars such as Ford, Buick, Maxwell, etc. It is driven by belt and regulation is taken care of within the generator. It sells for $20 to $50 according to the installation and is made by the Hendricks Novelty Co., Indianapolis, Ind.

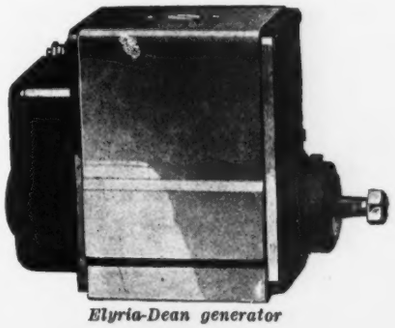
Xcel-O-Lyte—The Xcel-O-Lyte Co., Newton, Ia., is manufacturing an electric lighting for installation upon cars in service at $50. This formerly was known as the Best-Lite and was described in detail under that name in earlier issues.

Esterline—The Esterline Co., Indianapolis, Ind., has brought out a generator especially for Fords. It has permanent magnets and is driven by a belt which also runs the fan. The feature of the machine is the use of the permanent magnets in connection with an electro-magnetic field, the result being a greatly increased output, it is said. All the necessary attachments are furnished with the generator, it is stated, that the machine can be applied in 3 hours, and that it is not necessary to remove the radiator or other parts of the car to do it. The regulation of the current is inherent. An automatic cutout is provided for disconnecting the battery when the speed of the generator drops so low that the battery would discharge through the armature windings. The cutout is mounted directly on the generator, thus reducing the wiring to a minimum. The machine has an output of 10 amperes and weighs 24 pounds.

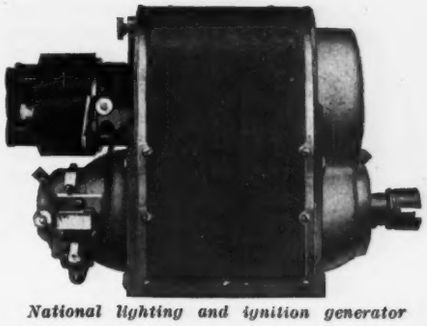
Teco Battery Charger—A magneto-type generator for keeping the storage battery charged, whether it be for lighting or ignition, is the Teco charger manufactured by the Tritt Electric Co., Union City, Ind. This has a current output of 7 amperes at 10 volts and is arranged particularly for Ford installation, although it is applicable to other cars. It costs $20.

Autrec Battery Charger—The American Battery Co., Chicago, is just placing on the market a new rectifier for charging batteries from alternating current in garage or repair shops. This is arranged so that a 6-volt, a 16-volt or a 24-volt battery can be charged from an ordinary lighting socket. The charging rate is 2 emperes and the rectifier sells for $24.

Westinghouse Rectifier and Lamps—Westinghouse Electric & Mfg. Co., Pittsburg, Pa., is making a rectifier for charging batteries in garages from alternating current. This is of the vibrating type and is designed to charge three-cell batteries. The charging rate is about 8 amperes. For larger batteries the Cooper-Hewitt type of mercury vapor converter is supplied. This concern also offers lighting generators and a complete line of lamps, making a particular feature of the McCandless Mazda lamps.

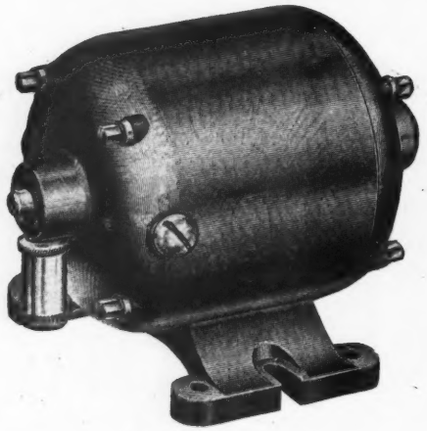


Elyria-Dean generator



National lighting and ignition generator

E & M limousine lamp



Jackson lighting generator

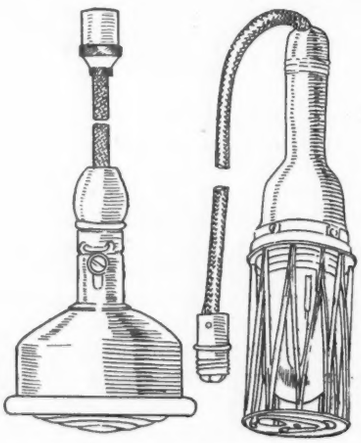
St. Louis Rectifier—The St. Louis Electrical Works, St. Louis, Mo., is marketing the St. Louis rectifier of 6-volt 6 ampere size at $24. Another product of this concern is an electromagnet for recharging magneto magnets. It is of the twin coil type and sells for $7.50. It operates at 6 volts.

B. & L. Lamps—The B. & L. Auto Lamp Co., New York, specializes in lamps for motor cars. These include electric, gas and oil lamps of various types, a complete outfit for Ford cars being supplied.

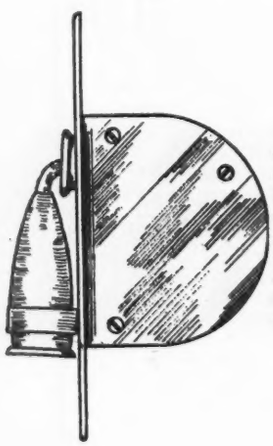
English & Mersick Lamps—The English & Mersick Co., New Haven, Conn., in addition to its body hardware, radiators, windshields and limousine window fixtures is manufacturing several stypes of lamps designed particularly for closed vehicles. One of the feature models is the colonial pillar type of lamp illustrated in these pages.

Solar Lamps—The Badger Brass Mfg. Co., Kenosha, Wis., features a very complete line of lamps of all types for motor cars. One of the specialties is the construction of the headlights, which have hingeless doors and outside focus adjustment. Double-bulb headlights of various shapes are offered, as there are headlight, sidelights and taillights. Among the latest of the productions is a double-filament bulb to give the dimming feature. One of the filaments is out of focus and a special controling switch is provided.

Mangin Mirror-Lens Reflectors—C. & A. Matisse, New York, a concern very old in the manufacture of optical goods, manufactures a special type of lens reflectors of the mirror type. One model is the Gold mirror or monochromatic reflector, in which the reflecting coating consists of a layer of pure gold of a special tint adapted to reflect monochromatic light only. This is designed to increase the luminous reaching capacity of light, and owing to the special color of the light projected, increases the visibility of the road, an effect still more pronounced in the fog.



Benjamin trouble lamps



Electric automatic cigar lighter, flush type. Lighter is on a cord, which when pulled out automatically turns on the heater and is rewound automatically

Victor Lamps—Victor lamps are provided in many styles for electric, gas and oil burning. Combination tail lamps and license holders are offered and a special lighting outfit for Ford cars is provided at $15.

Cowles Lamps—C. Cowles & Co., New Haven, Conn., in addition to a complete line of fittings and hardware for enclosed cars and open cars, offers a wide selection of electric lamps. These include side, pillar, dome, disappearing, tail and step lights.

Corcoran Lamps—Lamps for motor cars in a number of styles and sizes are manufactured by the Corcoran Lamp Co., Cincinnati, O. These include electric, gas and oil lamps and one feature is an electric number lighting lamp, whose casing is a part of the license bracket.

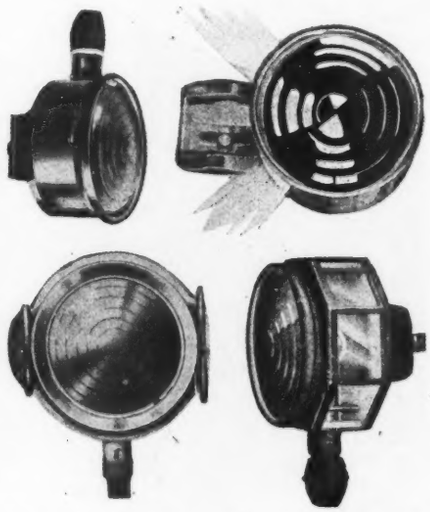
Saratoga Pilot Lamps—The Saratoga Pilot Lamp Co., Saratoga Springs, N. Y., is offering a small searchlight designed to be mounted on the left front fender. It is equipped with green lenses and throws a green light that may be discerned by cars approaching in either direction. It serves to make distinct the outline of the car and render collision less likely.

Electrobola Head and Searchlights—The Garage Equipment Mfg. Co., Milwaukee, Wis., supplies its Electrobola lamps, both as headlights and searchlights. The head lamps are made up in 6, 8, 10 and 12-inch sizes.

Alexander Electric Lamp—A similar type of lamp is that made by the J. Alexander Mfg. Co., New York. This, like the one just mentioned, uses any No. 6 dry battery and the attachment of the lid makes the connection. The regular line of this concern is lamps and glassware.

Neverout Accessories—A device brought out by the Rose Mfg. Co., Philadelphia, Pa., is a rod license clamp which may be used for fastening license tags no matter whether they have slots or not. This clamp consists merely of two pieces of metal, one end being shaped to go around a rod; near the other end there is a bolt. When used on license tags with slots the bolt is placed in the slot and the other end of the clamp fastens to a cross rod. However, when there are no slots the edge of the license tag is inserted in the lower end of the clamp and when the bolt is drawn tight it pinches the edge, thus holding it securely. These clamps sell for 25 cents a pair, and the dealer's price is $1.50 per dozen. Another new accessory is the Never-Out electric rail lamp which has an almost universal application.

E. & J. Lamps—The Edmunds & Jones Mfg. Co., Detroit, Mich., has brought out an improved form of electric lamp with several recently patented features. The old construction wherein the reflector was attached to the door portion which also carried the lens has been discontinued in favor of a form in which the lens and the reflector are each a separate unit attach-



Above, two types of Solar tail lights; below, Neverout at left and E & M at right

ing to the body of the lamp. A series of spring-backed pins on the outer rim of the body go through key-hole slots in the mating rim of the reflector, and when the latter is then turned, these pins are brought to the small ends of the slots, the heads holding the reflector flange against the lamp body through the aid of the flat springs.

Newtype lamp and mirror—An ingenious little lamp is made by the Wood Mfg. Co., Fairfield, Conn. It is mounted on a universal bracket and can be pointed in any direction for sign reading; a small concentrating mirror is set on the back of the lamp casing and serves as a rear-view glass; its form is such that it includes in a small area enough of the road behind the car to permit the driver to see what is going on to the rear of his machine.

Dash lamps with switches—A series of dash and extension lamps is shown by J. H. Faw, of New York, in which a convenient switch, operated by a stud is incorporated. One of these is a clock lamp with a bowl-shaped hood; the price is $1. A speedometer lamp with switch costs $1.25; these prices include bulbs. These lamps are also made to fit into sockets in the dash from which they can be removed and used as extension lamps by attaching cables.

Nokolyd Rear Signal—A rear signal for motor cars which shows the words "Stop," "Right" and "Left" by means of a signalling device at the rear of the car has been put on the market by the Nokolyd Signal Co., 40 West 13th St., New York City. The device was illustrated in Motor Age, Jan. 7, and is controlled by a handle on the steering wheel.

Auto-Signalite — American Taximeter Co., New York, makes the Auto-Signalite, which consists of a combination license number illuminator, tail light and signal. It consists of a cylindrical casing of sheet metal which holds the license bracket, within which is a large incandescent light and a revolving signal.

Ideal Regulite—One of the difficulties of lighting Ford lamps from the magneto is the rather poor regulation of current from this source, which is not intended primarily as a lighting generator. To provide a more constant supply of current from the magneto, a number of regulating devices have appeared, one of which is the Ideal Regulite, manufactured by the Metal Stamping Co., Long Island City, N. Y. This concern also supplies Ford lighting outfits, which may be obtained either with or without the Regulite.

Victor headlight at left and Superior at right

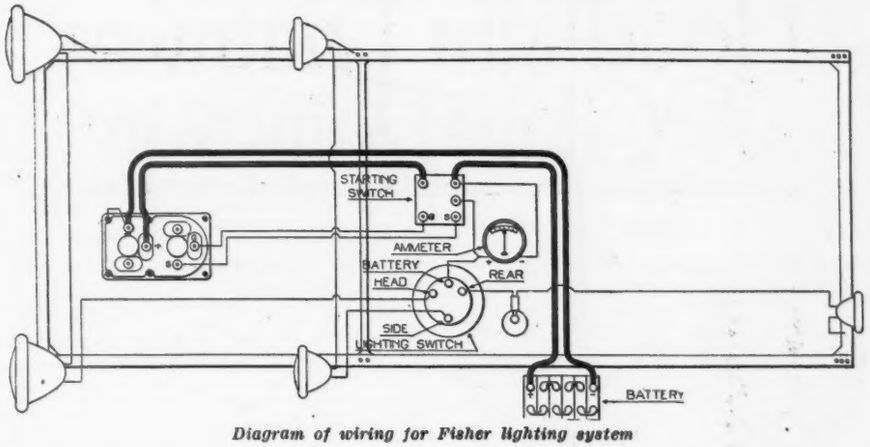
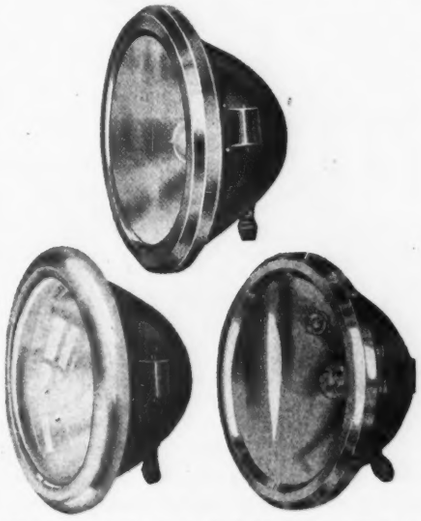


Diagram of wiring for Fisher lighting system

Regulite—Another regulator for Ford magneto current is the Regulite made by the Benjamin Electric Mfg. Co., New York. This is a combination switch and electric controller, which automatically chokes the magneto current to the lamps, preventing it from rising to a voltage too high for the lamp capacity. The price is $2.50.



Above and left, E & M headlights; below, B & L headlight

Superior Lamps—The Superior Lamp Mfg. Co., New York, specializes in Ford accessories, among which are several models of electric and oil lamps and electric adaptors for oil lamps and a magneto lighting system. This concern also supplies V-type radiators for Fords and a streamline hood for this car.

Presto Specialties—The Metal Specialties Mfg. Co., Chicago, is offering a line of accessories including the Presto electric hand lamp which sells for $1.25. It is in the form of an adjustable light made for attachment to an ordinary dry cell. The Presto Ford cigar lighter also is made.

Spot-Light—For use as a trouble lamp the Auto Air Compressor Co., Wilmington, O., is making a battery portable lamp called the Spot-Light which is designed to use the ordinary dry cell. A metal can holds the dry cell and the action of attaching the cover which carries the swinging reflector and bulb completes the connection.

Electric Automatic Cigar Lighter—A device that will be appreciated by smokers is illustrated on these pages in the form of an electric cigar lighter made by the Electric Automatic Cigar Lighter, New York.

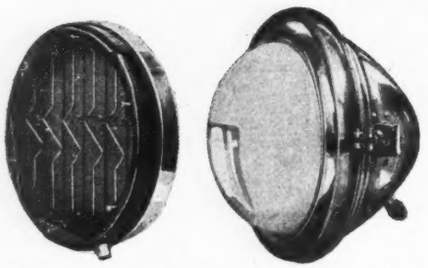
Weston Meters—A full line of electrical testing meters such as ammeters, voltmeters, etc., is marketed by the Weston Electrical Instrument Co., Newark, N. J. These are made for permanent installation and also are offered in the vest pocket type and for battery charging outfits.

Prest-O-Lite Products—The Prest-O-Lite Co., Indianapolis, Ind., is marketing acetylent tanks for lighting purposes and also for use in oxy-acetylene welding and cutting. It also markets the Prest-O-Primer which makes starting easy by priming the cylinders with acetylene gas. The primer is attached easily and sells for $4.

Searchlight Gas—The Searchlight Co., Chicago, is marketing acetylene in tanks for use in oxy-acetylene welding and cutting and for other purposes.

Spotlight, which uses No. 6 dry cells

Headlight Dimmers and Glare Removers



Nodaz glare remover, at left, and J-M non-blinding lens at right

J-M Non-Blinding Lens—Made in sizes to fit any size of standard lamp, this device, the product of the H. W. Johns-Manville Co., New York, is constructed of annealed glass, hemispherical in shape and frosted over its entire surface with the exception of a transparent oval, 3 by 5 inches in size, and slightly below the center. Through this oval area, a beam of light is projected, forward and downward, illuminating the highway so effectively that the radiator and front wheels of the car are clearly visible. The price per pair is $5.

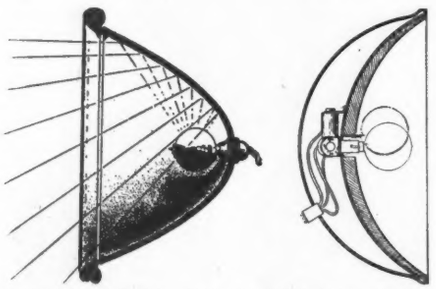
Hick-Myer Deflector—This device, which snaps around the headlight bulb and deflects the rays of light down the road but does not blind the driver of an approaching vehicle, is manufactured by the Hickmyer Deflector Co., Toledo, O., and sells for $2 per set. The chief claim made for it is that it is not a dimmer, although it can be used on any car equipped with a dimmer, but that it increases the volume of driving light, the deflector throwing the light far and low ahead of the car and eliminating all glare.

Safety First Headlight Shade—This is quite a novel device for dimming headlight and consists of a translucent roller shade, which is attached to the top of the lamp, and a set of cables that are attached to the foot mechanism, one cable passing out between channel iron and radiator to the lamp and another crossing over back of the radiator to the opposite channel iron and passing out to the lamp for operation by the driver. The shades are enclosed in black tubes, are rolled up when not in use. The maker of this accessory is the Eclipse Mfg. Co., Syracuse, N. Y.

H-M Headlight Ray Controller—This safety first fitment, the product of the H-M Mfg. Co., of Providence, R. I., is a specially prepared glass which shades the lamp, diffusing the powerful glaring rays from the upper part of the reflector, and allows a searching beam to be thrown upon the highway from the lower part without dimming the headlight. The price per set varies according to size and style of glass as follows: bent glass, 8 by 11½ inches, $3.50; flat glass, 9 by 11 inches, $2; flat glass, 7 by 8¾ inches, $1.50, and special Ford size, $1.50.

Osgood Autolight Deflector—Made of corrugated glass and to fit any size of lamp, the device deflects the rays without diminishing the light. It is easily attached as the operation consists of substituting the prismatic lens for the glass in the lamp. A pair of these deflectors, manufactured by the Osgood Autolight Deflector Co., Chicago, sells for $5.

Nodaz—Ward Leonard Electric Co., of Bronxville, N. Y., has brought out a headlight glare remover which consists of a special lens shutter of opaque material designed to be operated electrically from the seat. There are five vertical shutters which, when closed by the operation of an electromagnet, completely cover the glass and permit enough light to shine through for driving but which obliterate the intense rays causing glare. For country work, the shutters are opened by pressure on a button on the dash and the full brilliancy of the lamps is obtained.



Hick-Myer deflector at left and Matisse at right

Matisse No Glare Lens—In the belief that blinding effects of headlights are caused by the improper reflection of the rays and that the glare can be removed by proper design of the reflector, C. and A. Matisse, New York, has developed a special shape of lens designed to provide a distribution of light which eliminates the glare and at the same time, give sufficient light for driving. It is called a spherical paraboloid lens. In addition, a further dimming device has been developed where by pressing a button on the dash, the bulb is tilted upwards enough to alter the focus so that the reflected light is all directed on the roadway within 100 feet of the car.

Hampton Glareless Lamps—This lamp, which is made by the Hampton Glareless Lamp Co., New York, is designed to eliminate the diffusion of light and to project a straight beam. These objects are accomplished by mounting in the lamp directly in front of the bulb, a tubular member, which catches and throws forward the stray rays which would otherwise scatter. The Hampton lamp, Cadillac model, is 9½ inches in diameter and the price is $26 per pair with 6-volt bulbs of 15, 18, 24 or 50 candlepower. The Packard type, 9½ inches diameter, is $40 per pair.

GREASES AND OILS

Non-Fluid Oil—The New York and New Jersey Lubricant Co., New York, is featuring two grades of Non-Fluid Oil, K. No. 000 for bearings and K. No. 00 for gears, and announces the following new list of prices: 3-pound cans, 60 cents; 5-pound, $1; 10-pound, $1.75; 20-pound, $3; and 50-pound, $7.

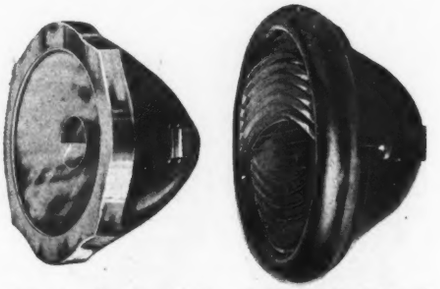
Badger Gear Compound—The maker of this lubricant, the Wadhams Oil Co., Milwaukee, Wis., claims that it clings to the gear teeth at all speeds, does not pack on the sides of the gear case and will not run thin.

Packard Cylinder Oil—This lubricant, made by the Greenslade Oil Co., Detroit, Mich., is designed so that it will not carbonize the pistons or cylinders of an engine.

Frazer Lubricants—The Frazer Lubricator Co., with works at Chicago, New York and St. Louis, announces for 1915 two grades of motor oils, the Frazer, selling at 75 cents a gallon and the Penza, retailing at 70 cents a gallon, as well as a line of transmission, cup and fiber greases and graphites.

Lubriko Grease—This is a three-in-one grease to be used in the transmission, differential gears and cups and since it has a high melting point, it will stand much friction and heat, it is claimed. It is manufactured by the Commercial Lubricating Co., Philadelphia and comes in 5, 10, 25 and 50-pound cans.

Harris Trans-Compound—The feature product of the line of oils and greases made by the A. W. Harris Oil Co., Providence, R. I., is a dark colored compound, designed for transmission gears. It is a very heavy oil with a consistency about the equal of that of grease. In actual use, it becomes fluid and meshes thoroughly with the gears, providing a heavy fric-



Hampton device at left, and Osgood deflector at right

tion-reducing film between all contact surfaces, and when motion stops, it drains off from the gears, leaving them coated with a thick lubricating film. This compound sells for 10 cents a pound if purchased in barrel or half barrel lots. A 5-pound tin costs 90 cents.

Polarine—The Standard Oil Co. is the refiner of this lubricant, the chief claim for which is that it will remain liquid at temperatures below zero. Red Crown gasoline also is featured as a product of the concern.

Dixon's Graphites—The Joseph Dixon Crucible Co., Jersey City, N. J., is recommending the use of the following lubricants to the motorists of 1915: motor graphite, for cylinders, springs, bearings and other parts subject to excessive friction; graphite transmission and differential grease, a lubricant of medium density; graphite gear oil, a light-bodied lubricant for transmissions and differentials that are intended to be lubricated with light oil; graphite nonleak grease, an adhesive lubricant for leaky housings; graphite heat-resisting grease, adapted for universal joints, etc.

Deflocculated Graphite—Oildag and Gredag are the two motorcar lubricants produced by the International Acheson Graphite Co., Niagara Falls, N. Y. These consist of deflocculated graphite diffused in oil, in the case of Oildag, and in grease, in the case of Gredag. Deflocculated graphite is graphite reduced to the molecular form, so that the advantages of graphite in a lubricant are obtained without any tendency to clog.

Veedol Lubricants—The Platt & Washburn Refining Co., New York, is making the following motor oils: Veedol light, medium, heavy and extra heavy; Veedol Zero, for cold weather driving; Veedol Crystal, a clear white oil of medium body; Veedol Steam Cylinder, for lubricating the Stanley, White, etc.; Veedol Disk Clutch, for multiple-disk clutches; Veedol Worm Drive, for rear axles; and transmission gear oil in medium and heavy grades.

Gargoyle Mobiloils—The Vacuum Oil Co., Rochester, N. Y., is continuing for 1915 the manufacture of a line of lubricants that gained prominence in seasons past. This company makes only four grades of motor oils—A, with a medium body; B, with a heavy body; E, with a light body; and Arctic, with a light medium body—in the belief that these are all that are necessary to lubricate any make of engine under any conditions. Grades C and CC are made for transmissions and differentials.

Texaco Oils—The Texas Co., New York, is the refiner of a series of oils and greases for use in motor car engines and other parts of the vehicle. In addition, the concern produces special lubricants for various services, such as heavy-duty steam engines.

Ideal Lubricants—W. S. Sheppard, Newark, N. J., the maker of this line, is featuring the following products: Ideal motor oil, light, medium and heavy; Special Crystal, Ideal Special Packard, Ideal gear oil, Commercial Car oil and Fibroviscos.

Panhard Lubricants—George A. Haws, New York, is offering the following Panhard lubricants for 1915: Cylinder oils in light, medium, heavy and extra heavy grades; transmission lubricants, heavy gear oil and gear compound; and anti-fluid transmission greases—A, a soft, sticky, fibrous grease; B, a fibrous grease of medium consistency; and C, similar to B but more clinging and with a higher melting point—cup grease; graphite lubricant; and cork graphite lubricant, which is mixed with granulated cork which works out into cracks in leaky gear cases and forms a cushion for worn gear teeth.

Oilzum—This lubricant is manufactured by the White and Bagley Co., Worcester, Mass., which claims that the high flash that its product possesses results in its remaining as a lubricant under the extreme conditions of high temperatures and heavy pressures, specially adapting it for continued high speeds as well as ordinary service.

Viscos Lubricants—The product, bearing this trade name and made by the National Oil and Supply Co., of Newark, N. J., consists of oils and greases for lubricating cars; also soaps and polishes for washing the bodies of motor cars.

Baum's Greases and Soaps—Baum's Castorine Co., of Rome, N. Y., is making an extensive line of lubricants, soaps and supplies of a similar nature, featuring the following products: motor car soap, sponge, grease, graphite grease, metal polish, cyloilene oil, neatsfoot oil, gear oil, leather dressing, varnish renewer and tire talc.

DEVELOPMENT in storage battery building during the past year seems to have been toward somewhat less exaggerated design in the matter of plate thicknesses. For several years previously, the tendency had been to thinner and thinner plates in the effort to produce lighter and more compact batteries. But recently it has been found that a happy medium gives longer life without too great bulkiness or weight. In the thin plates, the effort was to stand overcharging; it has been found lately, however, that with the modern lighting and starting systems the tendency is more toward undercharging; under which conditions, the sulphating causes some thin plates to buckle more quickly than they otherwise would do. The retrogression toward the medium thick plates, then, is a step in the right direction.

LBA Batteries—Products of the Willard Storage Battery Co., Cleveland, O., comprise a complete line of accumulators for ignition, starting, lighting and electric vehicle work. New types of starting batteries designed to withstand the extraordinary demands of motor starting service are the feature.

Exide Batteries—The Electric Storage Battery Co., Philadelphia, Pa., maker of Exide batteries and Chloride and Tudor accumulators, is featuring the new type LX Exide lighting and ignition battery. It has a number of departures from previous practices. Each of the cells which make up the complete battery is a separate sealed unit. The arrangement of the gas vent and filling aperture is such that the cells cannot be overfilled. Terminals are of a new design adapted to seal conveniently and hold permanently the connecting wires. They are of an acid-resisting alloy and are said to be as handy to operate as binding posts.

Gould Batteries—The Gould Storage Battery Co., New York, is the maker of the Gould battery and features accumulators for electric vehicles. The elements are designed so that Gould renewals fit jars of any make.

Edison Batteries—The Edison battery is the outcome of 10 years of experiment on the part of its inventor, Thomas A. Edison, and is manufactured by the Edison Storage Battery Co., Orange, N. J. Edison batteries differ from the conventional type in that, instead of using lead plates and an acid solution, a combination of iron and nickel in an alkaline solution is employed. The chief feature claimed for this type of battery is that any chance of sulphating is done away with and the metal jars are more rugged than the rubber ones.

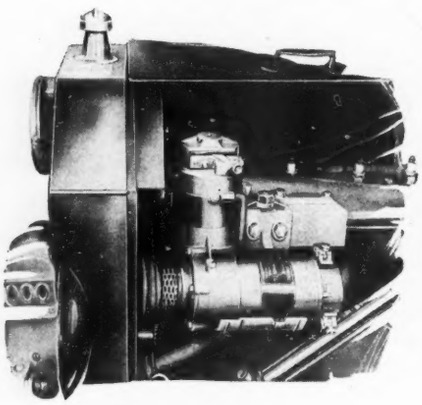
U. S. L. Batteries—The U. S. Light and Heating Co., Niagara Falls, N. Y., is fea-

turing its type K battery for electric lighting and ignition and similar service. The plates are of the Faure, or pasted type, and the cells are completely sealed inside the case, so that there is no slopping or creeping of the acid and the interior of the battery box is kept dry.

Gardiner Storage Battery—A new storage battery recently has been placed on the market under the name of Gardiner Bus-Bar battery by the Gardiner Storage Battery Co., Chicago.

While in the construction of the Gardiner battery the accepted standards essential to lead-acid battery construction are involved, some new features have been introduced through which extraordinary high voltage maintenance and extremely low internal resistance are obtained, it is claimed. The plates used in the Gardiner battery are extremely hard and exceedingly porous. The porosity allows the gases to discharge freely, relieving the internal strains in the plates and this coupled with the hardness prevents buckling. The hardness of the plates prevents disintegration and shedding and no sediment will accumulate in the bottom of the jars to cause short-circuits, it is stated. In place of the customary concealed connections between plates, overhead bus-bar connectors are used in the Gardiner battery. There can be no creepage of acid and the top of the battery as well as all connections at all times remain dry and all internal resistance is eliminated and each individual plate can be tested at any time.

Special Starting Systems for Cars in Service



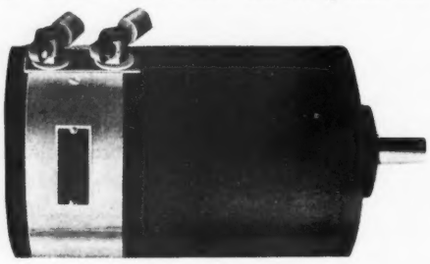
Hartford-Ford system

STARTING and lighting systems naturally have been the subject of considerable development by accessory and equipment makers during the past year. In fact, probably there have been greater steps taken in this field than in any other one department of the motor car industry. In the series on electric lighting and starting systems, which began in the January 7 issue of Motor Age, the various electric lighting and starting systems, as used by the 1915 cars as stock equipment, are taken up in detail. Among the systems described in detail in that series are Auto-Lite, Bijur, Bosch, Bosch-Rushmore, Delco, Dyneto, Leece-Neville, Northeast, Gray & Davis, Remy, Wagner, Westinghouse, Ward Leonard, Simms-Huff and Splitdorf-Apelco.

Consequently, it is unnecessary to go into the features of these systems here. Many of the concerns manufacturing such equipments have brought out special outfits designed for installation on the Ford. In addition there are a number of concerns who are specializing on equipment designed for cars which do not have these starting systems applied at the factory. The new Ford starting and lighting system brought out by Gray & Davis, Boston, Mass., is a single-unit system which supplants the two-unit system for Fords, announced a few weeks ago, and more data in regard to the line was given in Motor Age, issue of January 7..

Kemco systems produced by the Kemco Electric Co., Cleveland, O., including the Kemco-Ford outfit, were described in Motor Age January 7. Likewise the new Apelco starters which now include a special Ford installation were described in Motor Age of that issue. The new Westinghouse motor-generator was described in that issue, as was the high-speed starting and lighting system for Ford cars produced by the Hartford Suspension Co., Jersey City, N. J.

The Genemotor, a 12-volt motor-generator brought out specially for Ford installations by the General Electric Co., Schnectady, N. Y., was described and illustrated in that issue. The new electric system for



Briggs starting motor

Fords manufactured by the Chicago Electric Specialties Co., Chicago, and called the Cesco, was described in Motor Age, January 7, as was the new starting motor transmission brought out by the Brown-Lipe Gear Co., Syracuse, N. Y.

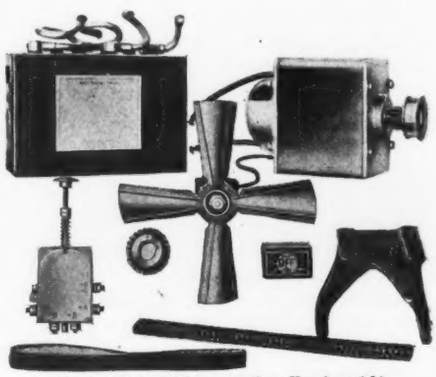
North East Electric Co., Rochester, N. Y., has brought out a system of electric starting and lighting designed especially for installation on the Ford. This is in the form of a small compact motor-generator designed to crank the engine at between 175 and 250 revolutions per minute. One of the features of the construction is that there are double sets of brushes on the commutator, two for each terminal. This permits the machine to operate even though one or two of the units break.

Briggs Magneto Co., Elkhart, Ind., has developed a combined lighting and ignition unit on the magneto principle, which is called the Maglite, and a cranking motor. The Maglite is designed to be mounted on the motor in place of the magneto. The field has two windings, one of which is idle except when the lights are on. The ignition is supplied through a circuit breaker and distributer, similar to those used on magnetos. In connection is a relay box containing the transformer coil for the ignition and a reverse current cutout, of the telephone relay type. The generator provides a 6-volt current. The starting motor is a 6-volt instrument, cylindrical in shape and weighing 30 pounds.

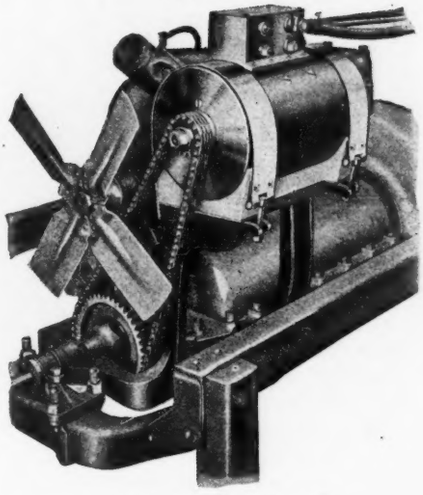
Jones Electric Starter Co., Chicago, makes several motor-generators. The 6-volt system is the one commonly used, but 8, 12 and 16-volt types are also made. When starting the unit operates as a series motor and when furnishing current for lights and storage battery, as a shunt generator. Current regulation is by a vibrator, which cuts resistance in and out of the field circuit. This vibrator, together with the starting switch and the cutout are mounted in a case on the top of the unit.

Disco equipment for 1915 will consist of two single-unit models. These machines are rectangular in shape with rounded edges, and with the combined cutout and regulator mounted on the top of the instrument. These instruments are built for 12 volts, although a larger or smaller voltage will be furnished when desired. Also for very large installations separate motors and generators will be furnished. Drive is usually taken direct from the crankshaft by means of a silent chain. Generation of current begins at about 10 miles per hour with ordinary gearing and reaches full output at 13 miles per hour. The current is held from rising as the speed increases by means of the regulator, which automatically inserts a large resistance in the shunt field. The new generators have been reduced in size and weight.

Allis-Chalmers—A larger size motor-generator is the addition to the Allis-Chalmers line. This company, which is located in Norwood, O., is continuing the motor-generator for smaller cars, and in addition makes separate starting motors and gen-



Parts of Splitdorf-Apelco Ford outfit



Federal-Cesco for Fords

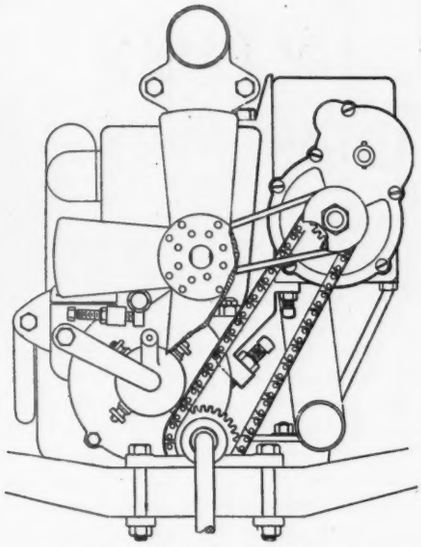
erators. Each of these are manufactured in one model and in two sizes. Six volts are standard and either the single or double wiring systems may be used. As a generator, the unit is designed to cut in well below a car speed of 10 miles per hour and to generate full charging current as soon as possible.

U. S. L.—One motor-generator of the flywheel type will be manufactured by the U. S. Light and Heating Co. for 1915. The design, however, is modified to suit each installation as regards flywheel weight and torque. Weight has been reduced 25 per cent and the space occupied by the entire system about 30 per cent. The 12-volt system is standard and double wiring is recommended for starting and either double or single for lighting.

Fisher Electrical Works, Detroit, Mich., continues to make its electric lighting system, which is attachable to any car, and sells for $37.50, and has also perfected a cranking and lighting outfit for Ford cars. The main unit of the latter—the motor and generator—is housed integrally, though there is a separate armature and field for both the motor and generator, one being positioned directly above the other. The Ford outfit is designed for chain drive, and consists of bracket switches, 12-volt, 35-ampere storage battery and wiring. The price is $120. Gear connection between the armature of the motor and that of the generator is a part of the unit itself, and when the electric motor is operating, its power goes through this gearing and thence through the chain to the crankshaft.

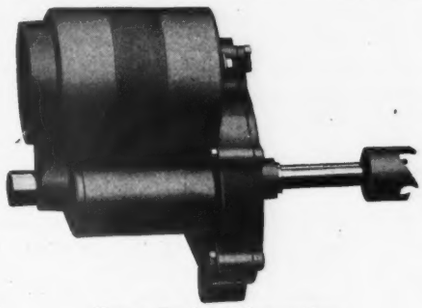
Bendix Drive—The Eclipse Machine Co., Elmira, N. Y., continues to market its Eclipse-Bendix automatic gear transmission for starter drive, which operates from a push button conveniently located and requires no levers, resistance switches, clutch, etc. It was fully described recently in Motor Age.

Perfect—A pneumatic motor starting system is produced by the Motor-Compressor Co., Newark, N. J. It consists of a motor



Installation of Fisher-Ford system

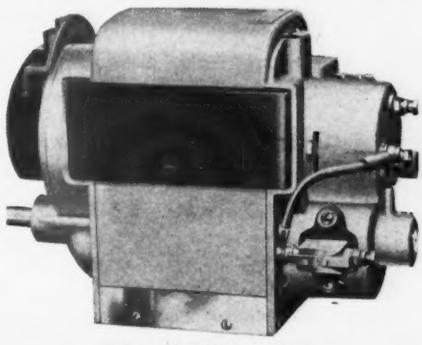
compressor which operates as a two-stage compressor for storing air in a tank to be released later into the same instrument, which then acts as a compound air motor to crank the engine. It is connected with the crankshaft directly and



Kemco Ford starting system

weighs 30 or 55 pounds, with complete equipment, depending on whether it is designed for a small engine or a large one. It is stated that it compresses air in the tank to a pressure of 300 pounds per square inch in 3 minutes.

Housel—Among the pedal starters designed particularly for Ford cars, the Housel Ford starter may be mentioned. It is made by the Century Foundry Co., Syracuse, N. Y., and sells for $25, ready to install. The arrangement is such that the engine is turned over by pressure of the foot upon a pedal, the leverage being such that seat cranking is said to be very easy.



Briggs Maglite generator

Gemco—A seat starter designed particularly for Fords is the Gemco, made by the Garage Equipment Mfg. Co., Milwaukee, Wis. This is a pedal starter in which the engine is turned over by a cable. The outfit is very easy to install and sells for $15.

Boston starter for Fords is a mechanical seat starter, which has a feature that retards the spark automatically before starting and releases in case of a backfire. A further feature is that the attachment does not interfere with cranking in the ordinary manner.

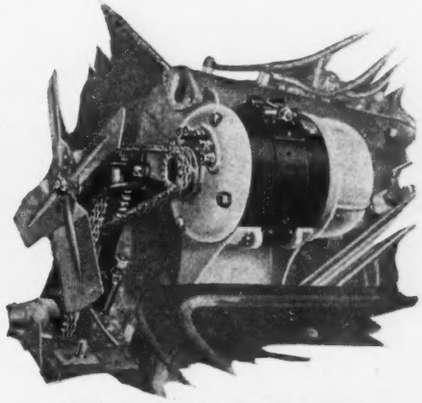
Overturn—A starter, by which the Ford engine is cranked from the seat by releasing a spring attached to the crankshaft, is the Overturn, manufactured by the Overholt Co., Galesburg, Ill. This is particularly easy to attach, as it is necessary only to bore one ⅜-inch hole in the wood dash.

Cleveland—Another spring cranker is the Cleveland, designed for Fords. This is made by the Forest City Electric Co., Cleveland, O. It is easily installed on any Ford car without machine work. It is sold at $45.

MOTORING NOVELTIES

Pedersen Ford Lubricator—A new lubricator for the Ford car, selling at $7.50 and consisting of a gallon oil tank, a small positive rotary pump, and an adjustable sight feed, is made by the Pederson Lubricator Co., New York. The pump is mounted on the end of the timer shaft, and the sight feed which is connected to the pump is fastened to the engine head by the timer spring bolt. The pump drawing the oil from the tank forces it through the sight feed, from where it is fed to the engine through the breather tube. By the adjusting screw on the sight feed the finest regulation can be made.

Brown Sub-Base Oiler—A special oiling device for Ford cars, which is attached to the bottom of the crankcase, is made by the Brown Co. It is stated that it is completely automatic, although there are no adjustments, no pumps and no sight feed. It is installed by removing the hand-hold plate under the crankcase and using the same bolt to attach the oiler. A garage pump, which is designed to be driven by an electric motor, has been brought out by this company. It has four cylinders arranged in the same plane at 90 degrees.



North East unit installed on Ford

Special Types of Tops

GOLDE One-Man Top—The Golde Patent Mfg. Co., New York, has introduced this year a one-man top for roadsters. The working principle of this top is like the four other types for touring cars, having a single pivot on each side of the body, around which the top turns while being raised or lowered. By means of an extension similar to a lazy tong system, the top may be raised or lowered through the single manipulation of raising or lowering the second top bow and thereby folding or unfolding the hinges. The lengths of this top range up to 68 inches. Three different equipments are furnished with the tops, equipment A consisting of black enameled sockets made of seamless steel tubing; equipment B, of black enameled slat iron construction, varnished in natural, oak, dark mahogany or dull ebony; equipment C, of black enameled sockets similar to the first equipment and made of domestic tubing. The five types are covered with waterproof canvas, mohair or pantasote. Back and side curtains both are furnished with celluloid windows.

Perkins-Campbell One-Man Top—The Perkins-Campbell Co., Cincinnati, O., is this year introducing a one-man type of top for Ford cars, costing $45. This top works by swinging on two sockets on the rear arms of the body. The top is raised or lowered by pushing on the leading bow, the two supports start bending and thence folding snugly at the rear of the car. There is a special attachment on the first upright, consisting of an eye in which a brace hooks to make the top rigid when down. The front bow of the top hooks on to the windshield by means of a hook buckle. The top is equipped with quick-adjusted curtains. Mohair and leather are used in the construction.

Cleveland Bow Sockets—The Cleveland Hardware Co., of Cleveland, O., maker of drop forgings for motor cars, is featuring this year a line of bow sockets for one-man tops. They are made in various dimensions and prices will be furnished on application.

Holden One-Man Top—The Holden One-Man Top Co., New York, is continuing this year the manufacture of its one-man type top for Ford cars. It is attached to the rear arms of the body by means of two sockets on which the top is swung when raised or lowered. It is raised or lowered by pushing on the main bow, the rigid supports then bending and then folding snugly at the back of the car. The front bow is fastened to the windshield by a strap. Three types are sold, complete with full side curtains, dust envelope and curtain bag. These are No. 1, made of khaki cloth, listing at $40; No. 2, made of silk mohair, listing at $40, and No. 3, made of regular Ford rubber cloth, listing at $35.

Solitaire Top—The Pantasote Co., New York, is continuing this year the manufacture of the top invented by Douglas E. Bonner, associated with that company. This top can be raised or lowered in 2 seconds by one person, it is claimed. With the dust cover removed, it is possible to put up the top with equal speed from any position within reach. All that is necessary is to give it a push and it falls into place.

Jiffy Curtains—Jiffy curtains are made by the Jiffy Auto Curtain Co., Detroit, Mich., and, as the name indicates, are curtains attached to the car top. They are strung upon specially-treated, black-enameled cable and are operated from within the car. The door curtains slide upon the cable supports, thus admitting of entrance or exit quite easily. They can be fitted to any top and made of any fabric to correspond. At either end of the doors, they are provided with straps to hold them tightly about the car's body. The panels of light are furnished with round, oval or square ends.

Laidlaw Burbank Coverings—Covering cloth for tops and seats that is waterproof but contains no rubber is the 1915 offering of the Laidlaw Co., New York, to the accessory field. Because it contains no rubber, this cloth can be cleaned with soap and water or gasoline without fear of injuring it.

Chase Cloths and Fabrics—The L. C. Chase Co., Detroit, is offering a line of mohair body fabrics, robes, top fabrics and leather for use in upholstery, etc.

Numotor Fabrics—A line of rubberized cloths for tops, curtains and upholstery is marketed by L. J. Mutty Co., Boston, Mass. All shades and designs are offered.

Neverleek Top Material—A fabric that resembles leather in appearance but the foundation of which is rubber, making it waterproof, is the guaranteed product of the F. S. Carr Co., Boston, Mass. The maker claims that the material will not crease when the top is folded and tends to shed the dust. The claim also is made that it can be cleaned easily and that when rained up or washed, the dust is washed off and not soaked in. The fabric comes in a dull pebble style or semi-bright long grain.

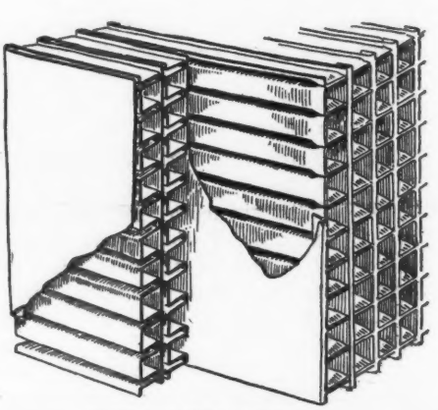
Latest Ideas in Radiators

NATIONAL Radiators—The National Can Co., Detroit, Mich., has what is said to be a new principle of construction in its radiators. In place of individual tubes, they are built of continuous bands of tough corrugated brass, forming an integral unit. The construction is shown in one of the illustrations.

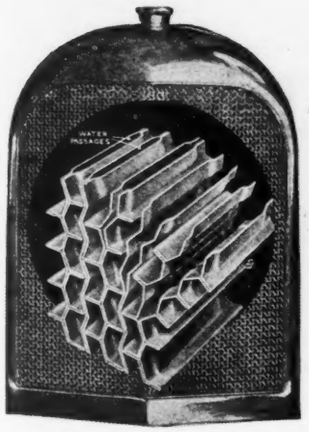
McCord Radiators—Although the McCord Mfg. Co., Detroit, is still manufacturing its original type of tubular radiator, it has added, since that original design was brought out, several different forms of cellular radiators, and this year has added a hexagon cellular which is said to be a true honeycomb. McCord's latest development in the drawn-steel shell construction is the method now used of making the frame entirely separate from the core and bolting the two together. This makes repairs simpler and less expensive, for the core is easier to remove. It also permits a much higher temperature to be used in the enamelling process than formerly was possible with built-up shells, it is said. In the construction of the McCord cellular radiator, a series of vertical metallic strips are crimped or pressed into ¼-inch squares and separated by flat strips with the edges so formed as to maintain a proper water space between them. The water circulates vertically and the pockets in the horizontal folds of the crimped sections make for a large capacity. In the newest McCord, instead of having the strips crimped into squares, they are formed into hexagons, which gives more surface exposed to the air.

Fedders Radiators—The Fedders Mfg. Co., which makes the Fedders' radiator at its Buffalo, N. Y., plant, is now in a position to insure quantity production. These radiators are now standard equipment on many of the better types of American cars.

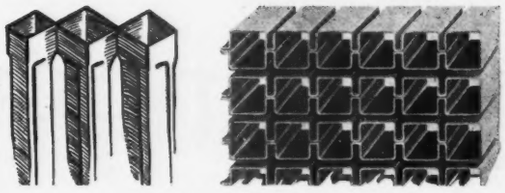
Briscoe Radiators—The Briscoe Mfg. Co., Detroit, continues to make cellular and tubular radiators. The cellular type is constructed of a series of square sections of brass which are formed with the central portion somewhat corrugated to allow a water space. The ends are swedged and



Section of McCord radiator



Construction of National Radiator



Two types of Briscoe radiators

squared so as to solder together in good shape. Due to the flexibility of the construction largely on account of the partial corrugation, there is considerable elasticity, which prevents freezing from springing leaks in the sections of the honeycomb, it is claimed. The Mercedes type of core construction gives a square effect radiator. The tubes are formed from a strip of metal which is crimped to give circulation almost entirely around each tube. The vertical and horizontal spaces are the same thickness. The construction is such that the water in passing through the radiator flows almost entirely around the tubes, giving the air passing through large surface for it to act upon.

Candler Radiator—Types of radiators known as the Special and the Cellular are the product of the Candler Radiator Co., Detroit, Mich. The first of these, the Special, consists of a series of I-beam sections, which are mounted one upon another in series and soldered into a solid vertical unit. A strong piece of channel-shaped heavier metal is placed between each of these units. The vertical channel strips between each series of I-beam pieces make a space through which the water flows, while the air is free to pass through the sections. The cellular Candler is not of true cellular construction, but has the square-tube effect.

Ford Tapered Radiator—V-shaped Ford radiators, made in such a manner as to fit the car without any alterations with the exception of lengthening the starting crank, are made by the Auto Parts Co., Chicago. They are equipped with an improved Chicago honeycomb core, with the efficiency that is gained by having the cores on an angle.

Piston Rings and Brake Materials

LEAK-PROOF Ring—In the Leak-Proof piston ring, made by the McQuay-Norris Mfg. Co., St. Louis, Mo., there is no open vent to permit of the escape of gas, the basic idea being two opposed concentric rings, which equalize the radial pressure. It is made in two parts and these interlock so that no joints are formed, which permit of the escaping of gas. The flange at each section of the ring, as shown in the accompanying illustration, closely seals the expansion opening in the other section, so that on all sides gas-tightness is obtained.

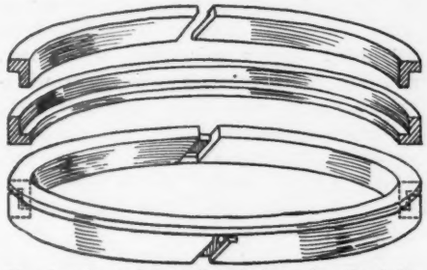
Ever-Tight Piston Rings—The Ever-Tight Piston Ring Co., St. Louis, Mo., offers a piston ring that is made of three individual interlocking rings, grooved together to give flexibility and reduce friction. It is claimed that this ring gives as good compression out of round cylinders as it does true ones.

Dunham Piston Ring—The feature of the Dunham piston ring, made by the Dunham Piston Ring Co., New York, is that it has a sealed joint and expansive spiral tension which is designed to prevent leakage.

Wasson Concentric Piston Ring—The Lake Sales Co., New York, has brought out for Ford owners a special type of the Wasson concentric piston ring that sells for 35 cents. The size of the ring is 3¾ by ¼ inch. In addition the company carries a complete stock for other makes of cars.

Micro Piston Ring—The Micro Piston Ring Co., New York, has a two-part pressure-tight ring that expands against the cylinder equally in all directions, which, it is claimed, gives contact to three separate and distinct bearing surfaces at every point of the cylinder wall. In its operation the outer ring seals the opening in the inner ring, so as to prevent a break in the continuity of the bearing surface and pressure tightness.

Thermoid Brake Lining—The Thermoid Rubber Co., Trenton, N. J., is specializing on its hydraulic compressed brake lining, which is used on many high-grade cars. One of the advantages of this lining, according to the manufacturer, is that it retains its maximum gripping power until it is worn to the thinness of paper. The process of hydraulic compression makes this lining a solid substance of uniform density all the way through, and actual service, it is said, has demonstrated that it resists frictional heat, and is not affected by oil, water, gasoline or dirt.



Construction of Leak-Proof ring, showing interlocking joints

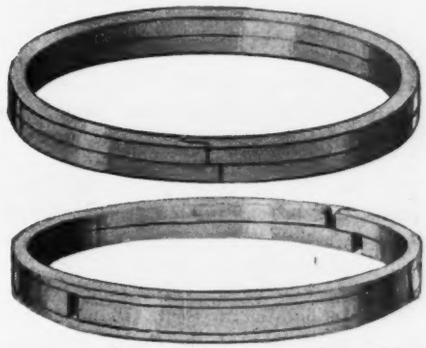
Multibestos Brake Lining—For Multibestos, manufactured by the Standard Woven Fabric Co., Framingham, Mass., it is claimed that no material puts a strong barrier between the motorist and possible danger, inasmuch as it gives him a firm, sure control of his machine at the time he needs it. This material is to be found inside the brakes of many of the standard cars now on the American market.

Raybestos—The feature of Raybestos, made by the Royal Equipment Co., of Bridgeport, Conn., is that every strand is woven and interlocked, one with another, into a homogeneous fabric which is used for brake linings on motor cars. The fabric also is chemically treated.

Elektra Brake Lining—The F. L. Norton Mfg. Co., Boston, Mass., is the manufacturer of Elektra asbestos friction brake lining, which is made of selected asbestos, chemically combined by a patent process with an indestructible metal, offering a high co-efficient of friction. It is claimed neither oil, water nor vapor affect it.

Hartford Electric Brake—The Hartford Suspension Co., Jersey City, N. J., manufactures an electric brake. The brake is controlled by a small lever beneath the steering wheel, a slight movement of the finger, without removing the hands from the wheel, applies the brakes. A light, increasing pressure is used for gradual checking, while a quick, full pressure means the stop instantaneous. A reverse movement releases the brakes. In a nutshell the system is comprised of a small Hartford motor, a small big-reduction gearing, a small winding-drum, a small steel cable and the little lever under the steering wheel. Its total weight is 40 pounds and the price is $150.

S-M-C Brake Lining—S-M-C asbestos brake lining is made by the Staybestos Mfg. Co., Philadelphia, Pa. It is said to be very compactly woven and thoroughly treated with a special compound. Large steel rollers compress it to exact size. Transmission linings for Fords also are a specialty of this concern.



Above, Dunham spiral tension ring; below, Micro expanding ring

Miscellaneous Accessories for Motoring

GRINNELL Gloves — Glove comfort is the aim of the Morrison-Ricker Mfg. Co., Grinnell, Ia., in turning out its product. Among the recent innovations introduced in the gloves made by this company are Rist-Fit, which prevents the cuff from sagging down over the hand; Grip-Tite, a corrugated double palm, which gives a non-slip grip on the steering wheel, and the ventilated back, which lets in the cool air, yet excludes the dust. These gloves are made of selected reindeer and coltskin and are washable in soap and water or gasoline.

Gearless Differential—The Gearless Differential Co., Detroit, Mich., still is making its form of releasing clutch which is designed to take the place of the conventional gear differential. In addition to this type, a design for Ford cars has been brought out which may be fitted to the Ford axle without alteration of the Ford mechanism, the compensating gears however giving way to special ratchets which are a part of the gearless assembly.

The standard form is the same in operative principle as the Ford type, only instead of the walking beam form of pawls, rollers form the connection between the driving member and the driven one. The inner driving member is fixed to the shaft, and its pawl cams pick up the rollers when the rotation is reversed. These are carried towards the center of the runways by their own inertia. A similar set of parts on the opposite side take care of rotation in the opposite direction.

M. & S. Differential—The Brown-Lipe-Chapin Co., Syracuse, N. Y., has the American manufacturing rights for the M. & S. differential, which, it is claimed, insures a positive and equal pull on both wheels at all times, saves wear on rear tires, permits of shorter turns and enables the owner to utilize all the motor power for driving the car. Both rear wheels must turn together, it is asserted. It is pointed out that this differential fulfills all the functions of the ordinary type and then goes one step beyond by utilizing the rotative moment when it is most needed. Instead of driving the wheel having the least traction, that having the greatest is given the more power and instead of any loss due to slipping wheels or bad roads, this is compensated for by the automatic action of the differential. A special type is made for Fords.

Spicer Universal Joint—The Spicer Mfg. Co., located at South Plainfield, N. J., is the maker of the Spicer universal joint found in so many of the modern motor cars. No change in construction for 1915 is announced, the company priding itself on its precision of manufacture.

Budd Sheet Metal Work—The Edward G. Budd Mfg. Co., Philadelphia and Detroit, is an extensive manufacturer of sheet metal work, including steel roofs, fenders and bodies.

Dover Metal Specialties—The Dover Stamping & Mfg. Co., Cambridge, Mass., is manufacturing, among other specialties, a complete line of galvanized funnels, buckets, cans, etc., of every conceivable size and shape adaptable to garage use. The line manufactured by the company consists of no less than 235 articles that are used every day by motorists. One item which is meeting with general favor is the electric light bulb case, which enables the motorist to carry a supply of electric bulbs of various sizes without danger of breakage.

Mandel Limosette—The Mandel Limousine Co., Chicago, is manufacturing a line of closed bodies especially designed for Ford cars. These bodies are in roadster and touring size—in the former case transforming the car into a handsome coupe, and in the latter into a comfortable limousine. They are durably constructed of kiln-dried lumber reinforced with steel, and are equipped with rain-vision windshield, electric dome light and cowl dash.

Eclipse Machine Co.—This company, which is located in Elmira, N. Y., has just placed on the market the Eclipse anti-rattler for Ford cars. This device is designed to keep the steering wheel tight so that it responds instantly to the touch of the driver. At the same time it stops the annoying rattle which is the usual accompaniment of loose parts. The anti-rattler retails at $1 a pair.

Steady Steerer—To prevent the side sway in a Ford car due to the construction of the spring assembly wherein both front and rear springs are hung between two shackles or links that are free to move sidewise, the Lockwood-Ash Motor Co., Jackson, Mich., has placed upon the market an invention known as the L-A Steady Steerer. It consists of a strut so connected between the body and the axle as to hold the latter in a position that will cause the road wheels to remain in a straight course set by the steering wheel. It accomplishes this by drawing the axle sidewise on upward movement, and by pushing it on downward movement, thus keeping the relative distance between steering knuckle and steering post the same under all driving conditions.

It is also claimed that the Steady Steerer will permit shock absorbers to be fitted to the front springs efficiently. Many types of absorbers cannot be applied to Ford front springs because they raise these springs higher from the axle and the added number of joints makes the body sway even greater. The steerer prevents this swaying also.

Sulzberger's Sterilized Curled Hair—Before Sulzberger's sterilized curled hair goes on to the market to be used in motor car upholstery it is given an antiseptic treatment that makes it clean and enhances its natural life and vitality. Then the product is seasoned in skeins. In this state it is again sterilized and its "curl" given time to set. All this treatment makes it so light, fluffy and resilient that a 50-pound sack is said to be twice the size of the man who carries it. The manufacturer is the Sulzberger & Sons Co., of Chicago.

Packard Protected Cable—The feature of this cable, which is used in the wiring of many standard cars, is the manner in which it is protected against oil and heat. This protection is built into the cable and consists of a flexible enamel, which is applied to each conductor and to the completed cable. The Packard Electric Co., Warren, O., is the manufacturer of this cable, which is made in various types and sizes suitable for starting and lighting.

Jones' Prepared Wax—S. C. Johnson, of Racine, Wis., offers a preparation which can be used with effect on the body, hood and fenders, it being claimed that this prepared wax preserves the varnish and protects it from the weather, besides cov-

ering up small scratches. It is said that mud is more easily removed when this wax is used, and that where the varnish has become rough, a smooth, new body can be built up by applying several coats of the wax, allowing ½ hour intervals between coats.

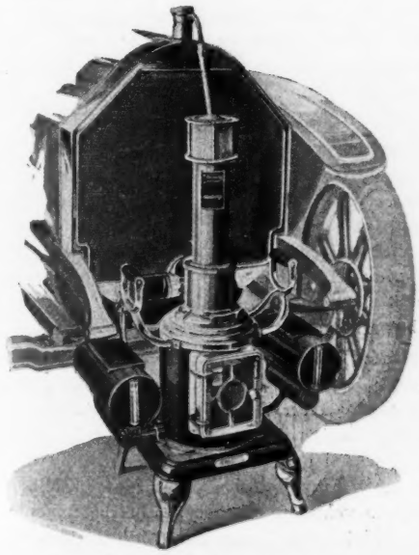
Peerless Dressing—The Columbus Varnish Co., Columbus, O., is specializing on a variety of products adapted to the renovation of the motor car. Among these are the Peerless dressing for mohair and leather tops and cushions, lining dye, lamp enamel, fender japan, cylinder enamel, etc.

Valentine's Varnishes—In the renovation of a car it is essential that the paint, varnish and enamel be of the highest grade to insure adequate service. Valentine & Co., New York, a large manufacturer of high-grade paints and varnishes is marketing a line of high quality and which is admirably adapted for the fine finish required for the modern car.

Wizard Washer—This device, which is made by the Century Foundry Co., Syracuse, N. Y., will, it is claimed, enable the owner or garageman to wash a car quickly and thoroughly. It consists of a specially designed nozzle, a ball-bearing turbine motor, a 14-inch extension and two interchangeable brushes—one long and pointed that gets into the corners, the other shaped like a sponge for flat surfaces and general cleaning.

Shelby Seamless Steel Tubes—Peter A. Frasse & Co., New York, is the distributor of Shelby seamless steel tubes, which, as usual, are offered to the trade in all sizes and dimensions.

Neverout Direct Heating System—The Rose Mfg. Co., Philadelphia, Pa., in putting the Neverout on the market reduces the cold weather difficulties of the motorist who keeps his car in a cold garage. The device takes the form of a small stove that burns kerosene, the capacity being 2 gallons, which will burn from 36 to 48 hours with one filling. A connection from the stove to the radiator permits of the water being taken from the lower part of the radiator through a drain cock, passing through a copper coil above a screened flame, whence it is returned through the water filler tube of the radiator of the car.



Neverout radiator heater

Springfield Convertible Body — The Springfield Metal Body Co., 150 Birnie avenue, Springfield, Mass., offers Ford owners an all-year-round vehicle through the use of its convertible body. In the summer the top folds down in the same space as the ordinary car top. For spring and fall use, the top is put up, but the windows are not put in place, while in winter the top is supplemented by windows which gives a completely closed car of the sedan type.

Closed Bodies for Fords—The Ford owner who desires to transform his car into an all-the-year-round vehicle will be interested in the Sedan De Luxe body recently put on the market by Irvin Robbins & Co., Indianapolis, Ind. The addition of this body makes the Ford a luxurious winter car. It will seat five passengers, and is equipped with electric dome lights, carpets, finely upholstered seats and many other niceties of the modern limousine.

Al-Ton Motor Car Heater—The Alton Sales Co., Cleveland, O., is producing an exhaust heater for car interiors. This has been made in limited quantities for 4 years. It utilizes the exhaust from the motor and is said to produce no back pressure. It sells for $25.

Vanguard Windshields — The Vanguard Mfg. Co., Detroit, Mich., which devotes its plant solely to the production of windshields, makes its specialty in a variety of sizes and styles to meet the demands of nearly any car. All of them are constructed of steel with black enamel finish. In many styles either coach or plate glass is obtainable, the former being considerably cheaper. It is thinner, and not so durable.

Chelsea Clocks—This is a line of clocks, made by the Chelsea Clock Co., Boston, Mass. Four types are offered, front wind and set, side wind and set, key and back wind and set. Flush types and the extended also are offered.

Boston Clocks—A complete line of motor car clocks of all types, including the flush types, outside permanent winding and setting and also an electric clock. Eight-day types are featured. The maker is the Boston Clock Co., Boston, Mass.

Eklips Spark Plug—The Fulton Co., Milwaukee, Wis., is marketing the Eklip spark plug in which the spark jumps from the fenter electrode to three upturned grounded terminals. It is made in mica and porcelain form.

K-P Heater—This is made by the K. P. Foot Rest Heater Co., New York, and is a form of foot rest through which exhaust gas passes. This heats the metal rest and hence keeps the passengers' feet warm. It is easily attached and sells for $25 complete with all parts necessary for fitting.

Scuder Master Vibrator—The Scudor Mfg. Co., Lowell, Mass., is building the Scudor master vibrator and selling it at $8. The coil is mounted in a waterproof, mahogany case fitted with a simple kick switch.

Auto Parts Racing Seats—The Auto Pars Co., Chicago, is marketing bucket type racing seats for all cars also special helical timing gears for the Ford, and special racing type gears for the same car.

Racing Seats—Another concern which markets bucket seats is the Chicago Auto Body Co., Chicago. The concern also offers all other equipment for changing roadsters into racing type cars.

Roper Gas Saver—C. F. Roper & Co., Hopedale, Mass., is offering a gasoline saver at $3 which is said to increase the mileage per gallon by 3 or more miles.

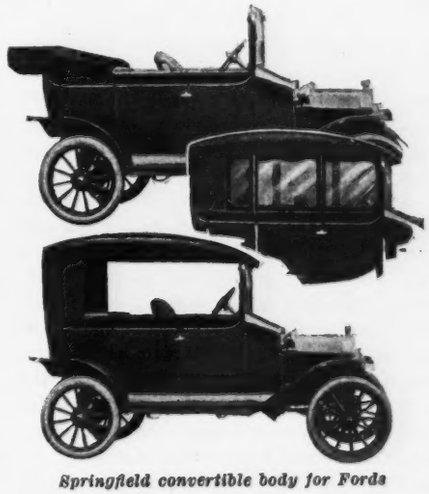
Bridgeport Pumps—A line of foot pumps is offered by the Bridgeport Brass Co., Bridgeport, Conn. The cylinders are of seamless brass tubing which cannot rust. The brands offered are the Stepley, Aeolus and Windjammer.

Supreme Oil—This oil is made by the Gulf Refining Co., Pittsburgh, Pa., and is offered in all grades. It is claimed to flow freely in zero weather and to burn with a minimum of carbon being deposited.

Laxine Carbon Remover—This is a liquid carbon remover marketed by the O-Lax Sales Co., Louisville, Ky. It is sold in quart cans.

Hoover Rim Remover—This is a tool made by the W. H. Hoover Co., New Berlin, O., and is used for quickly removing clincher and quick detachable rims. It folds up so that it can be placed into the tool box. Its price is $1.25.

Myers Tire Valve—This is a simple valve, made by W. M. Myers, Chicago, which releases all excess pressure in a tire and in this way tends to keep the internal pressure constant.



Springfield convertible body for Fords

"Great Oaks from Little Acorns Grow"

History of some of the Leading Concerns in the Accessory Field

No better exemplification of the old adage, "Great oaks from little acorns grow" can be found in the accessory branch of the motor industry. Most of them started small and grew up with the business and now the amount of capital involved would almost stagger Rockefeller. Many of these concerns have had interesting and romantic histories which are worthy of being told as possible encouragement for others who seek shining examples. It is because of this interest that Motor Age presents herewith thumbnail sketches of the growth of some of the leaders in the accessory industry. In many cases this information has been compiled by the companies themselves, and it is believed that those devoted to motoring will find in these short stories of wonderful progress a human interest that will hold their attention and make them proud of the fact that this country of ours is so progressive and able to turn out such fitments for the Modern American motor car, all "made in the U. S. A."

GRAY & DAVIS

Lamps, dynamos and starting motors

BOSTON, Mass., Jan. 18—The firm of Gray & Davis came into existence 18 years ago, when William Gray formed a co-partnership, under the name Gray & Davis, with the object of building lamps for motor cars. It is needless to state that there were very few motor cars in existence at that time. The initial capital was $3,000, of which Mr. Gray furnished $300 and his partner $2,700.

The first factory was located in Amesbury, Mass. Naturally, it was a very small brick building, and the production was about ten sets of lamps a week. At that time Amesbury was one of the big buggy and carriage centers, and it is quite possible that it was for this reason that the new lamp factory was inaugurated in that little town. In those days it was customary to receive from $75 to $100 for one set of lamps, and they were a very costly part of the car's equipment. In 1899 it became necessary to enlarge the first factory to quite an extent.

It is not generally known that Mr. Gray was a pioneer in the production of electric systems for motor cars. As long ago as 1907, he realized that the motor car was the most modern means of transportation, yet paradoxical as it may seem, the motor car was lighted by archaic, prehistoric methods—the open flame, oil, and gas. This certainly was not progress, and the lamp manufacturer set about to construct a system which would provide self-illumination for a self-propelled vehicle. In 1908 the first Gray & Davis dynamo made its appearance. This was at the show in New York. It created a great deal of interest, but was deemed impracticable, for the reason that a similar device had been tried abroad and proved to be a failure. Furthermore, the chief difficulty was in building a small dynamo capable of overcoming the variable speed of a motor car engine, and which would be compactly placed beneath the hood of the motor car.

It was very easy to design a large dynamo which would meet all requirements, but such an instrument would weigh perhaps 300 or 400 pounds, and of course, could not be taken care of on the motor car.

Mr. Gray persisted, however, and it was not long before the Peerless company adopted his lighting system. It proved very efficient, and then began the era of electric lights, to be followed shortly after by the production of a combined lighting and cranking system.

As time went by, the lamp factory was greatly enlarged until it now comprises six large, spacious buildings of mill construction. With the coming of the Gray & Davis dynamo, it became necessary to have a plant devoted to the exclusive production of the dynamo. Gray & Davis then moved into a large, modern factory situated at 55 Lansdowne street, Boston. This soon became too small, and the new Gray & Davis factory on the banks of the Charles river was planned. This plant is 380 feet long, 60 feet wide, five stories high. It contains over 3 acres of manufacturing space, which is entirely devoted to electrical equipment. In fact, it is one of the largest factories of its kind in the world.

Five years ago, the gross business of Gray & Davis amounted to about $150,000 a year. Last year this company did a gross business of between $4,500,000 and $5,000,000. It manufactured over 100,000 complete starting-lighting systems and over 400,000 electric lamps.

In the Amesbury plant, Gray & Davis employ 422 men. In the Boston plant over 1,000 operatives are employed. There are eleven departments and eleven department heads, aside from the president, vice-president, and general manager.

During the past 6 months, the firm has produced a starting-lighting system for Ford cars, and confidently expects to build over 100,000 of these systems during the next 12 months. This in addition to the 100,000 standard systems annually produced will tax the factory to the utmost, and it is expected that a new plant will be constructed before very long.

BOSCH MAGNETO CO.

Maker of Bosch magnetos, plugs and starters

SPRINGFIELD, Mass., Jan. 18—To trace the remarkable history of the Bosch Magneto Co. one must travel back 20 years over the trails to yesterday and stop before a small electrical shop in Stuttgart, Germany, where Robert Bosch, assisted by two helpers, first experimented with the wonderful source of energy that Benjamin Franklin found in the clouds.

The German scientist worked for 3 years before he made any great contribution to science. His first invention, marketed in 1888, was a magneto electric ignition device, which was adopted as the standard equipment for its stationary engines by the Otto Gasmotorenfabrik, at that time the most important plant in the gas engine industry in the world.

After working out several improvements and developments in his original magneto, Herr Bosch agreed to construct a low-tension magneto in 1890 for Daimler to be used on the motor cars built by the pioneer French manufacturer of gasoline-driven vehicles. Two types of instrument, in which were incorporated all the fundamental principles of the modern Bosch

magnetos, were made and received instantaneous endorsement.

The manufacturing end progressed slowly at first. The two-man shop of 1885 was a fifty-man factory in 1888 and in 1903 an enlarged factory was erected in Stuttgart for the manufacture of an arc flame magneto, which had met with immediate success upon its introduction. The new plant proved inadequate. In order to meet the demands made in 1905, the force of employes was doubled and worked in two shifts. Since that day the parent factory has been continually enlarged until today it has the facilities of turning out 75,000 magnetos annually.

Bosch magnetos were introduced in America in 1906 when a selling branch was opened in the Arcade building, New York, under the direction of Otto Heins. Foreign agencies already had been established in France and England and the great market in the United States prompted an invasion of trans-Atlantic territory.

In 1912 the company decided to establish a manufacturing plant in America and located at Springfield. A four-story factory, 315 feet long by 66 feet wide, was erected and in this structure, 1,000 men were given employment. The Bosch factory is modern in every respect. The lighting arrangements provide for the highest efficiency either in day or night and a unique ventilation system frees the building of the tiniest particle of dust.

Next to the construction of an American plant, the most important step in the advancement of the Bosch company in this country was the merger with the Rushmore company in 1914 when Bosch acquired the interests of Samuel W. Rushmore, maker of the starting and lighting device that bears his name, and took over the Rushmore plant at Plainfield, N. J. By this transaction, the Bosch field was not limited to ignition alone for the company immediately became prominent among the concerns making starting and lighting equipment.

WARD LEONARD ELECTRIC CO.

Maker of electric controlling devices

BRONXVILLE, N. Y., Jan. 18—The present organization of the Ward Leonard Electric Co. was formed by H. Ward Leonard in the mid-summer of 1892. The company was organized for the purpose of manufacturing electric controlling devices, and has continued in this line ever since, being the oldest concern in the world today which has specialized in electric controlling devices of all kinds, it is claimed.

During the first few years of its existence the company had factories in Bridgeport and later in Hoboken, and in 1897 moved in to the nucleus of its present plant in Bronxville. Since that time the factory plant in Bronxville has been repeatedly increased, the last increase being in the form of an additional building put up a little over a year ago.

The Ward Leonard company has manufactured and marketed the inventions of H. Ward Leonard and other engineers of the company during this period, the patents issued to Mr. Leonard alone totalling over 100. The company manufactured motor cars for a period of several years ending in 1902, during which time numerous patents were granted to Mr. Leonard covering improvements in gear boxes, transmission devices and other parts for motor cars.

The increase from the small beginning in 1892 to the present organization of the Ward Leonard Electric Co., is said to be largely due to the ingenuity and inventive ability displayed by the founder of the company and the various engineers of the company, and to the fact that the executive heads of the company have consistently endeavored to have all of the prominent employes interested in the company as stockholders as well as employes.

McCORD MFG. CO.

Radiators, lubricators and gaskets

DETROIT, Mich., Jan. 18—McCord & Co., a Chicago corporation manufacturing and dealing in railway equipment and supplies, became interested some 12 years ago in the John F. McCanna Co., of Chicago, which was making force feed lubricators for engines of different kinds. McCord & Co. were interested chiefly in the locomotive lubricator and acquired control of the business on account of that device. Almost immediately, however, a considerable demand for lubricators of this type developed in the motor car field and the McCord lubricator soon came to be recognized as standard—in fact, at one time over 80 per cent of the American-built motor cars were using them.

Prior to that time McCord & Co. had acquired the business of the McKim Gasket and Mfg. Co., which made copper asbestos gaskets, which have since become known as McKim. These also were originally designed for service in the steam power field, but were quickly adopted by the car manufacturers for various joints in their motors.

At a latter date, or in 1906, McCord & Co. acquired a radiator business which had been started as the Stolp Mfg. Co., of Chicago, and all the above products were for a time manufactured by McCord & Co. at a factory located on West Kinzie street, Chicago. The radiator business grew by leaps and bounds and as their principal customers were located in Detroit—notably Ford, Wayne and Cadillac—when the question of increased factory facilities became acute, it was only natural that Detroit was considered as a new location. After some negotiations the present property was acquired, with a building which had been erected by the Hugh-Wallace Co. This building was of modern construction, three stories high and contained approximately 40,000 square feet of floor space. A new corporation then was formed and commenced business January 1, 1909, at this location, and the McCord force-feed lubricator, McCord radiator and McKim gasket have since that time been solely manufactured here.

At the time the concern was started in Detroit it was employing approximately 150 men and today under normal conditions, its payroll includes about 700 men. It has some 150,000 square feet of floor space in the plant and the output has increased about 100 per cent.

The officers of the company are: A. C. McCord, president, Chicago; Morrill Dunn, vice-president, Chicago; J. T. Schlacks, vice-president, Detroit; L. M. Hamlin, secretary and treasurer, Detroit; P. L. Barter, sales manager, Detroit.

All the above men, with the exception of Mr. Schlacks, have been with the organization since its inception in their present capacities and, of course, Mr. McCord has been the active and guiding spirit throughout its history. Mr. Schlacks is now the resident executive in charge, having come with us in July, 1912.

The radiator business has, of course, become McCord's biggest line, and as far as the motor industry is concerned, there are very few force-feed lubricators now in use, but the concern still is making a great many of these for gas engines, steam engines, air compressors, etc., of all kinds and types.

WESTON-MOTT CO.

Axles, hubs and rims

FLINT, Mich., Jan. 18—The history of the Weston-Mott Co. dates back to the year 1884, during the early days of the safety bicycle. At that time the industry consisted of the manufacture of bicycle hubs, rims and wire spokes. The decline of the bicycle business made it necessary to branch out into another line and wire wheels and naked axles for buggies and runabouts were brought out. The output was further increased by the manufacture of jinricksha wheels for Asia and Africa, invalid chairs, sulky, light agricultural implement and push-cart wheels, in fact, the development of all kinds of high-grade wire wheels.

In 1898 the factory at Utica, N. Y., was built and the company was right in line to furnish wire wheels for motor cars, which came very soon thereafter in quantities very large for those days, and the factory capacity had to be increased. Then, almost without warning, the bottom fell out of the wire-wheel industry and it was necessary to switch to the making of hubs and rims for artillery wheels, as now used on motor cars, and as the motor car makers insisted upon purchasing their hubs where they bought their axles, it was quietly recognized that the company must have axles.

In 1905 the company was approached regarding the establishment of a branch factory in Michigan, and as the limit of the

Utica plant had been reached, it was decided to leave it altogether and build a new factory in Flint of very latest construction, where all requirements of manufacturing at lowest possible cost could be met. In 1907 the factory of 60,000 feet of floor space was opened and before long this was found to be entirely too small to take care of the increasing business. Since then two additions have been made to the original No. 1 plant, which are called Nos. 1, 2 and 3 plants, with a total of 180,000 square feet of floor space, and in which plant are manufactured only rear axles. No. 4 plant has since been completed and consists of three floors, with 90,000 square feet of floor space. In this plant are manufactured only hubs and rims. No. 5 plant was then built and is used exclusively for the manufacture of front axles. The Weston-Mott modern heat-treating plant was recently built and is the most up-to-date building of its kind in the country. It is built entirely of steel and concrete and has 20,000 feet of space, making a total of 380,000 square feet.

In 1909, 25,000 sets of axles, hubs and rims were built and this year more than 75,000 sets will be shipped. The payroll of the company is very near to $2,000,000 per year. The line of manufacture now is confined to motor car axles, hubs and rims. In axles, the I-beam predominates, but the manufacture of the tubular type is continued on a small scale. The rear axles are of bevel and chain type and both ball and roller bearings are used. In the evolution of the business, trade requirements have grown very strict as to quality, design and noise, and the company has developed a large engineering department with chemical and physical laboratories, master mechanics, experimental, cost and accounting departments to meet all conditions.

The officers of the company are: C. S. Mott, president; H. H. Bassett, general manager; H. J. Mallery, comptroller; D. K. Moore, sales manager; F. A. Bower, chief engineer; W. N. Edson, purchasing agent.

ROSE MFG. CO.

License brackets and garage heaters

PHILADELPHIA, Pa., Jan. 16—The Rose Mfg. Co., of Philadelphia, marketed the Neverout bicycle lamp during the cycling days. Early in the history of the motor car, the Rose company began experimenting on various models of lamps for motor cars. It produced a lamp to burn acetylene gas, this being the first motor car acetylene gas lamp used in the United States, it is claimed.

The Neverout acetylene generators in their day were so successful as to be adopted by the principal governments of the world, the company being favored with a contract to supply acetylene generators and headlights for use on the Panama canal.

On the introduction of electricity this firm introduced headlights and side lights. After that it introduced many products for making motor cars more popular, the latest device being the Neverout radiator and garage heater. The Neverout license brackets, also, are well known.

GOLDEN, BELKNAP & SWARTZ CO.

Manufacturer of motors

DETROIT, Mich., Jan. 16—When the Golden, Belknap & Swartz Co. started in business in 1910 it only had one model of engine, that a 3¼ by 3⅜. Since then it has added four other models and at the present time it has an annual output of from 5,000 to 6,000 motors. The first year the company turned out only 500 engines. The plant originally occupied only 9,000 square feet of space, which since has been increased to 18,000. From thirty the number of workmen employed has been increased to approximately 120.

The company was incorporated in March, 1910, with a capital of $100,000, the officers being: E. Belknap, president; George W. Golden, vice-president; J. W. Swartz, treasurer; J. W. Wright, secretary.

SHELDON AXLE AND SPRING CO.

Maker of Sheldon axles and springs

WILKESBARRE, Pa., Jan. 18—The initial efforts of the first motor car builders centered in the perfection of a motor. The designing and perfecting of the motor occupied the major time of the engineer. Small production and the lack of facilities prevented the new builders from making in their own factories many of the vital parts of the car, as the most of their time was required for the making of the motor. This condition necessitated the buying outside of many of the vital parts of the car, chief of which were the axles and springs—the foundation on which the superstructure is built.

Many new companies were founded to take care of this new business, while many other firms of long standing were able to supply the needed parts because of their use in other industries. The Sheldon Axle and Spring Co. had been a successful maker of axles and springs for horse-drawn vehicles for years, and was the outgrowth of the partnership of Barker & Sheldon, formed in 1862, at Auburn, N. Y., for the manufacture of horse-drawn vehicle axles. Business was conducted under this name until 1872, when the corporate firm of Sheldon & Co. succeeded the partnership, the active management of the business coming under the control of Charles L. Sheldon.

In 1886 New York decided to abolish convict labor, and as a large part of the Sheldon product was made by convicts, it made necessary the securing of larger manufacturing facilities outside the prison walls.

Mr. Sheldon realized the importance of having his new factory nearer the source of the coal and steel industries. The city of Wilkes-Barre, Pa., was looking for such an industry, and a large tract of land was donated for the location of the factory. Fortunately, this factory site was bounded by the main lines of the Delaware and Hudson Railroad and the Central Railroad of New Jersey on one side and the main line of the Lehigh Valley Railroad on the other.

With the demand for Sheldon axles came many requests for springs of equal quality, and in 1900 the company acquiesced to the importunities of the trade and organized a spring department. With the organization of this department began a ne era in spring making.

The Sheldon company, until recently, never gave any publicity to its spring business, as it was a product the public and dealers could not buy direct. Recently, however, the management decided to tell the dealers and public about the service the leading builders were receiving from Sheldon springs and the manufacturing facilities of the Sheldon plant. In order to link more closely together these two big branches of the business the corporate name of the firm was changed November 5, 1914, to the Sheldon Axle and Spring Co.

From the inception of the motor car industry, the Sheldon company has furnished axles for both passenger and commercial cars, and at the present time is the largest manufacturer of worm gear axles for commercial vehicles in this country, it is claimed.

SPARKS-WITHINGTON CO.

Sparton horn, pump and fan

JACKSON, Mich., Jan. 19—The Sparks-Withington Co. was organized in 1900 and manufactures Sparton products, which include an electric warning signal, centrifugal pump and one-piece blade radiator fan. The company started with fifteen men and now employs 300 and in 1914 its business increased 40 per cent. The concern always has been located in Jackson and the moving spirits of the organization are Phillip H. Winthington, president; Winthrop Withington, vice-president, and William Sparks, secretary-treasurer and general manager.

WAGNER ELECTRIC MFG. CO.

Maker of engine starters and electric motors

ST. LOUIS, Mo., Jan. 18—The Wagner Electric Mfg. Co. was incorporated in 1891, with a capital stock of $25,000. This has been increased from time to time until now the capital of the company is $1,800,000, all paid, and with a substantial earned surplus. The manufacturing operations of the company were inaugurated as a partnership, in 1890, in a small retail store room on Olive near Nineteenth. In 1892 the plant was removed to a small building at 2017 Locust street. With the rapid growth of the operations of the company, this Locust street property was expanded into a plant with a capacity of 75,000 square feet of floor space. In 1906,

this factory having been entirely outgrown, new works were erected at Hillside, at the intersection of Plymouth avenue and the Wabash and Terminal railways. The Hillside site comprises 13½ acres. Eleven buildings have been constructed at this location. These buildings are modern in every particular, and embody the latest ideas, not only as to convenience of manufacture, but lighting, ventilation and sanitation. Hillside is termed by the company as Plant No. 1. As the operations of the company have increased rapidly ownership of the works at 2017 Locust street has been retained, and during the last year, this plant also has been operated as Plant No. 2.

The most rapid growth of the company occurred in the period between August, 1912, and December, 1913, when the total number of employes of the company increased about 300 per cent.

The officers of the company are as follows: President and general manager, W. A. Layman; vice-president, James W. Bell; secretary, Albert Blair; treasurer, W. S. Thomas; assistant general manager, Walter Robbins; assistant secretaries, W. S. Thomas and J. W. Westcott.

The products of manufacture of the company are as follows:

Single-phase motors, repulsion-starting, induction running type, from ¼ to 60 horsepower.

Single-phase motors, unity power factor type, from 1 to 15 horsepower.

Squirrel cage and wound motor types, polyphase motors from ½ to 400 horsepower.

Self-starting or starterless polyphase motors from 2 to 50 horsepower.

Alternating current generators, belted type, from 65 kilovolt amperes to 350 kilovolt amperes.

A complete line of alternating and direct current portable and switchboard measuring instruments.

Alternating current rectifier, for charging small low-voltage storage batteries.

Single-phase rotary converters, for charging electric vehicle batteries, and for moving picture projection lamps.

Distributing or pole type transformers, from 6/10 of a kilovolt ampere to 100 kilovolt amperes.

Power transformers from 50 kilovolt amperes to 1,500 kilovolt amperes, and voltages up to 66,000.

Motor car engine starters and electric motor car motors.

FINDEISEN & KROPF MFG. CO.

Manufacturer of Rayfield carbureters

CHICAGO, Jan. 18—The manufacture of the Rayfield carbureter was begun in 1909 by Charles Rayfield, who was then making his product in a small shop in this city. The merits and future possibilities of this carbureter were appreciated by the Findeisen & Kropf Mfg. Co., which was then manufacturing a large line of brass accessories, and incidentally making castings for these carbureters at its factory, Twenty-first and Rockwell streets.

Early in the year 1910 Findeisen and Kropf secured the rights to manufacture the Rayfield and purchased the interests of those then interested in its production. Since that time the progress made by the Rayfield has been rapid. Each year the output of carbureters has been greatly increased. The number of men now employed in its construction is 260.

The manufacturer of the Rayfield consider it a decided advantage that the plant is located in the central part of the United States. There is no doubt that all manufacturing interests have moved westward rapidly in the past 10 years. There are many advantages in being located in Chicago, among them the possibility of receiving raw material promptly, the shipping of the finished product, and what is more important, the advantage in securing competent mechanics to manufacture an instrument of this character, where good workmanship is absolutely necessary.

FIRESTONE TIRE AND RUBBER CO.

Maker of Firestone tires and rims

AKRON, O., Jan. 18—An army of workers, toiling night and day; machines whirring every hour in the 24; a small city in itself—that is the plant of the Firestone Tire and Rubber Co.

H. S. Firestone, who made possible the present plant on South Main street, began manufacturing rubber goods in a very small way. From the start Mr. Firestone believed that only a product of the best material could compete with the output of firms already established. Keeping that truth ever before himself and his workmen, he prospered. In 1900 the present company was incorporated and the first factory built.

Here is where Firestone side-wire carriage tires first were made. The demand for them grew so rapidly that a larger plant was soon necessary. In 1902 a much larger factory was built on Switzer avenue, adjoining the original plant. This plant, for a long time, was used in making Firestone tires. However, this factory was soon outgrown and it was imperative that larger quarters, which would permit of unlimited expansion, be obtained. The site of the present plant was bought after much deliberation and consideration of the probable trend of Akron's growth.

Mr. Firestone began to plan the company's future home. A model was built and the firm's head spent almost a year mapping out the interior. Every contingency that could be foreseen was taken into consideration. Hour after hour Mr. Firestone spent in passing a cord through the miniature factory, studying the most economical movement of material. It was no common piece of string to him nor did he see the tiny structure as others did. Rather, the cord was crude rubber being received, going through the various departments, being handled carefully by many men, taking shape and at last emerging—tires.

At last the planning was completed, the model was changed from all likeness to its original self, but Mr. Firestone had, in embryo, a factory that for its purpose could not be excelled. Every operation in the manufacture of a tire had been taken into consideration. Provision was made for enlarging the building with as little inconvenience as Mr. Firestone had been put to in altering his model. Absolutely nothing had been left to chance. That the Firestone vision was clear was evidenced when, within less than 2 years after the South Main street factory was occupied, additions had to be built and two new wings were soon in the course of construction.

The rapid growth of the demand for Firestone products excelled even Mr. Firestone's expectations and since the new plant was built in 1910 there has hardly been a time when new additions were not under way. During 1914 about 100,000 square feet of floor space was added to take care of the 78 per cent increase in output, over that of 1913, but no matter how much the building grows, Mr. Firestone's plan holds good and the efficient handling of the product is not interfered with in any way.

The present factory is of steel and concrete with a facing of light brick. The present floor space covers very nearly 14 acres. The structure's divisions into wings provides admirable lighting facilities and thorough ventilation. For sanitation, general healthful conditions and economy, Mr. Firestone's plans approach perfection.

The factory on Switzer avenue is still in use, but for the manufacture of Firestone rims only. Here, during 1914, enough steel was converted into rims to build twenty-four modern skyscrapers — 12,000 tons, or 24,000,000 pounds of special steel being used.

CONTINENTAL MOTOR MFG. CO.

Manufacturer of Continental motors

DETROIT, Mich., Jan. 18—Twelve years ago the first Continental motor was put together in a little machine shop on Bunker street, Chicago, by three men who at that time believed there were possibilities in the gasoline engine. The machine shop was equipped with four pieces of machinery, a few tools and much determination. Only twenty-five motors were manufactured the first year. Today Continental motors are manufactured in two plants occupying over 625,000 square feet of floor space and valued at over $2,000,000, and the same men are directing a production of over 40,000 motors per year.

The Continental Motor Mfg. Co. has been a growing concern since its organization and it took but little over a year to show that larger quarters would be

necessary. An attractive offer was received from representatives of the town of Muskegon, Mich., which resulted in a complete removal from Chicago in 1905 and the occupancy of a small plant in Muskegon which contained about 14,000 square feet of floor space. From this date on it has been necessary to build on to this plant each year to take care of the increased business until now it covers an entire block and provides employment for over 1,500 men.

In 1912 when the six-cylinder motor began to force its way into the trade, a plant of the most modern type, costing over a million dollars, was erected in Detroit for the sole purpose of manufacturing six-cylinder motors, while the Muskegon plant was retained for the manufacture of four-cylinders.

During the 3 years that this plant has been in operation the total yearly production of Continental motors has increased from approximately 15,000 to over 40,000 motors, while the total number of men employed in the two plants at the present time is approximately 2,500.

B. F. GOODRICH CO.

Maker of Goodrich tires

AKRON, O., Jan. 16—Back in 1869, Dr. B. F. Goodrich, at that time a real estate man in New York, secured, through a transaction, the equipment of a small rubber factory located at Hastings-on-the-Hudson. His first intention was to move this factory and to carry on a rubber business in Jamestown, N. Y., but he failed to receive the proper encouragement in that vicinity, and learning that Akron was a very promising town in the west, came here in search of help toward the promotion of the idea which he had in mind.

A meeting of several of Akron's influential citizens was called and the doctor succeeded in obtaining aid from Colonel George T. Perkins. The outcome of this alliance resulted in the machinery which Dr. Goodrich had acquired being shipped to Akron and located in a building on the present site of the B. F. Goodrich Co. This building was a small brick structure two stories high, and the original factory force consisted of twenty-five men. It was with this small beginning that the industry which now gives Akron claim to the title of the Rubber City was established.

In the early days of rubber manufacture, many of the products which now comprise a large percentage of the output had not yet been invented. The output of the early Goodrich factory consisted principally of belting, hose and molded goods, and the marketing of these products began in 1871. The first few years of this company's history were not altogether promising for the industry in Akron. People had not yet quite reached the place where they had confidence in commercial endeavors along this line, and Dr. Goodrich and his associates had a hard row to hoe for the first 10 years.

In 1880 the firm was reorganized on a larger basis and articles of incorporation were taken out for the B. F. Goodrich Co. With more local encouragement and with more funds upon which to base activities, Dr. Goodrich and his associates were enabled to branch out into new fields and to establish their company on the firm basis upon which it now rests.

At the end of 46 years of growth, the B. F. Goodrich Co. is one of the largest manufacturers of rubber goods in the world. The company is capitalized at $90,000,000, and maintains as a part of its organization not only 100 branches and depots in the United States, but also representatives in all foreign cities of importance.

The home factory comprises 70 acres of floor space and occupies a site practically 2 miles in circumference. There also is a branch factory at Colombes, near Paris, France.

The output of the factory comprises not only all kinds of rubber accessories for motor cars, motorcycles and bicycles, but also practically every other form of rubber goods. A total weight volume of nearly 100,000,000 pounds of freight is shipped out every year. This figure is made possible by a daily output, in round numbers, of 10,000 motor car tires, 14 miles of hose, 5 miles of belting, 60 miles of insulated wire, 20,000 rubber shoes, and similar quantities of material in other forms, covering the entire range of everything made in rubber.

BUDA CO.

Manufacturer of Buda motors

HARVEY, Ill., Jan. 18—The Buda Co. first started in Buda, a little town in Illinois, and was first known as the Buda Foundry and Mfg. Co. It was established in January, 1881, and therefore has been in existence 34 years. The business was started in a very small way and gradually grew. Eighteen years ago, the company moved to Harvey, its present location. Seven years ago, the name of the company was changed from the Buda Foundry and Mfg. Co., to the Buda Co. The company has had a prosperous and steady growth, and now is a very complete manufacturing plant, consisting of gray iron foundry, drop forge plant, heat-treating department, machine shops, assembly shops and testing department. The employes number up to 1,000 men when all departments are busy. The company has approximately $2,000,000 invested in plant and equipment, etc.

K-W IGNITION CO.

Magnetos, spark coils and master vibrators

CLEVELAND, O., Jan. 16—Some imagine that the name K-W is derived from the electrical term kilowatt, but the K-W Ignition Co. states that the combination of initials is derived from J. A. Williams, president and general manager, and William Kaple, vice-president and superintendent, both of whom are still the leading spirits in the concern. The company was formed in April, 1906, with a capital of $25,000, to build a magneto or low-tension generator for gas engines. At that time it was located in the Whitney building, using part of a floor.

The concern gradually branched out with other models of magnetos and added a line of spark coils. In 1907 it brought out its well known K-W master vibrator, of which it has made more than 130,000. Each year's business has been doubled and at the present time the company is employing about 600 men. The growth of the company soon absorbed all the available space in the Whitney building, so on December 13, 1911, it moved into its own building, a four-story structure to which additions since have been made in the shape of three large outbuildings and a warehouse.

REMY ELECTRIC CO.

Magnetos and starting and lighting systems

ANDERSON, Ind., Jan. 18—The Remy Electric Co. was started in 1899 and until 1904 the company made electrical devices for gas engines in a crude wooden building. Then larger quarters were sought and the manufacture of magnetos begun. The plant kept growing until now it comprises twenty-one buildings, giving a total floor space of 450,600 square feet. The company produces almost all the parts entering into its products and consequently has its own machine shops, brass foundry, nickel-plating, bakelite, pattern, forge, punch press and armature departments. A separate tool-making department is maintained. More than 1,500 are employed in the general offices, plant, branches and service stations.

For the past 2 years the company has been owned by a group of Indianapolis business men who have reorganized the business, added new machinery, rearranged the plant and installed systematic methods. H. W. Griffith is general manager, while at the head of the engineering department is O. F. Conklin, who has been a designer and producer of direct-current apparatus for more than 27 years, and for 4 years a specialist in the field of motor car lighting and starting.

NEW DEPARTURE MFG. CO.

Manufacturer of ball bearings

BRISTOL, Conn., Jan. 18—This is the quarter-centenary year of the New Departure Mfg. Co.'s existence. Starting in a small room, with some of the present executives working at the bench and with a handful of employes, the passing years have wrought from this small beginning a concern employing 2,000 skilled mechanics, machinery and tools representing an investment of several millions of dollars, in buildings the floor space of which totals nearly 14 acres. In other words, the floor space of the combined plants at Bristol, East Bristol, and the Hartford

division at Elmwood, would be equivalent to a one-story building 40 feet wide and nearly 3 miles long.

The New Departure company was organized June 27, 1889, as the New Departure Bell Co. It was incorporated with a capital stock of $50,000, for the purpose of manufacturing door, office and call bells. The mechanism represented important improvements over the then existing type of bells on the market. They were unique and from this fact the company developed its name and, in practically all its manufactures since, has truly maintained that name by originating new and improved devices.

The company began its work in a small room at the north end of the old Thompson clock shop on Federal street, Bristol, employing not more than six people at any one time at the start. After a time, however, a line of bicycle bells was developed and successfully marketed. So rapidly, in fact, did the business of the company increase, that the building known as the Jones factory, standing on North Main street and a part of the present plant, was purchased. The company removed to this building about a year after it was established and, for a time, occupied but one floor.

Meanwhile, New Departure bells were being sold in all parts of the country and one time the output of the factory was 10,000 bicycle bells a day.

A little later, the company manufactured the Lucas bicycle lamp, but the business was subsequently sold to the firm of Joseph Lucas & Sons Co., in Birmingham, England. Some 16 years ago, the company originated and marketed the New Departure coaster brake for bicycles.

In February, 1907, the company purchased the business and plant of the Liberty Bell Co., at East Bristol. The entire bell department, including a line of fire and car bells, was straightway removed to the purchased plant. This company is the largest manufacturer of automatic bells in the world, it is claimed.

In August of this same year the company discontinued marketing its product through selling agents and established a sales department of its own, with numerous salesmen traveling from the home office at Bristol.

A little previous to this time the company began an extensive investigation into the manufacture of ball bearings, the use of which was rapidly growing in this country, particularly in motor cars. Practically all ball bearings then were made abroad. This investigation was exhaustively conducted for several years and resulted in the equipment of a modern plant for the manufacture of the New Departure ball bearing. The first type developed was the double row, or combined radial and thrust bearing, which was entirely new. Later other types of ball bearings were added to the New Departure line.

This year the company removed its offices to the new administration building, located adjacent to the plant in Bristol. The building is 62 feet wide and 215 feet long, five stories high, and fireproof. The present officers of the company are: Albert F. Rockwell, president; Frank P. Furlong, vice-president; DeWitt Page, secretary and general manager; and Charles T. Treadway, treasurer. These men, with Charles F. Pope of New York and E. R. Burwell of Bristol, constitute the board of directors.

VEEDER MFG. CO.

Odometers, tachodometers, etc.

HARTFORD, Conn., Jan. 18—Making cyclometers, odometers, tachometers, tachodometers, counters, speed counters and castings, the Veeder Mfg. Co. now employs from 250 to 300 men when running full time. The company was organized in August, 1895, employing only twenty-five men. In 1897 it erected a factory on Sargeant street, a three-story and basement affair 110 feet in length and 30 feet in width. Since then it has doubled its factory floor space and added a three-story and basement office building.

FEDDERS MFG. CO.

Manufacturer of motor car radiators

BUFFALO, N. Y., Jan. 18—The Fedders Mfg. Co. first took up sheet metal specialties when it embarked into the mercantile world in 1897, but 7 years later it switched to the manufacture of radiators, its claim being that it was the first concern to market a radiator made of small, individual tubes which made for ease of repair as well as for efficiency. At the start the radiator business amounted to only $50,000 a year, but it has increased steadily until in 1914 it is estimated that the $1,000,000 mark was topped.

The company always has been located in Buffalo because of the fine shipping facilities. Since the start no change has been made in the personnel of the officers, T. C. Fedders being the original founder, with the active management vested in L. F., C. W. and J. M. Fedders. At the present time the company is employing more than 500 men.

STROMBERG MOTOR DEVICES CO.

Manufacturer of Stromberg carbureters

CHICAGO, Jan. 18—In 1906, several residents of this city, headed by Charles W. Stiger, decided to develop a carbureter and with this object in view a small space was secured at the corner of Michigan avenue and Thirteenth street, in which experimental shop equipment was installed and the work begun.

These men interested some of the leaders in gas-engineering research in the country to supply such deficiencies in knowledge as they themselves did not possess. The result was that early in 1900 the Stromberg carbureter appeared on the market in this country.

The business developed to such a marked degree and the possibilities of the establishing of a permanent business became so apparent to the men interested, that they decided to provide proper and permanent facilities for a considerable time to come by the purchase of ground and the erection of a building, negotiations for which were begun early in 1909, and the completion of the building the latter part of 1910, which is now located at 64-6-8 East Twenty-fifth street. It is one of the largest factories in the world devoted exclusively to the manufacture of carbureters, having a capacity of 750 per day.

The business has grown steadily from a limited production to a production of as high as between 500 and 600 carbureters in a single day. The equipment consists of the very latest machinery, much of which is of special design; the men are skilled, practically no boy or cheap labor is employed; the highest wages paid of any industry of a similar character in the city of Chicago, the result of which is the highest quality of workmanship is produced.

The plant employs from 300 to 450 persons, having an annual output of in the neighborhood of 100,000 carbureters.

The company has branches, distributors and service stations in all of the principle cities of the United States, the factory being located in Chicago, which is geographically the center of distribution in the United States, which in conjunction with all of the branches, distributors and service stations as above, enables it to give prompt and efficient service to all classes of users.

GOODYEAR TIRE AND RUBBER CO.

Manufacturer of Goodyear tires

AKRON, O., Jan. 18—The Goodyear Tire and Rubber Co. was formed in Akron in 1898, just at the threshold of the appearance of the motor car, which has done so much to advance the rubber industry. Frank A. Seiberling, president now and for many years, was its founder, and always has been its guiding and directing spirit. At first, the product consisted of bicycle tires and carriage tires.

The motor car appeared almost simultaneously with the formation of the company. Mr. Seiberling and his associates grasped the possibilities of the new industry—of itself and for them—and realizing that it would be up to rubber manufacturers to make or break the motor industry, according as they should succeed in making what was like a railway track for the new-fangled road locomotives to run on.

The experiences of the company in the beginning were various and lively. All tire makers made many experiments and had many disappointments before they alighted on a practicable, serviceable product, and Goodyear was no exception. The company worked sturdily along, how-

ever, meeting its problems and trials cheerfully, until about 1908, when it first began to step into national prominence. There was a time when President Seiberling boasted to some of his associates that some day Goodyear would make as many as 500 tires a day. Recently a high-water mark of over 11,000 pneumatic tires in one day was reached.

The Goodyear company offers a few figures, year by year, that show how production has grown: In 1909, 102,669 tires were produced; in 1910, 207,442 tires; in 1911, 332,458; in 1912, 883,224; in 1913, 1,132,869 tires; in 1914, 1,478,396, and in 1915, if general business conditions are anything like normal, Goodyear production will be close to 2,000,000 tires. The figures quoted are for pneumatic tires for motor cars only, and do not include motor truck tires, motorcycle, bicycle and carriage tires. Moreover, Goodyear now has a busy and thriving mechanical goods department, with production figures of its own. Goodyear's gross business last year was close to $35,000,000. About 7,500 persons are on the company's payroll.

THE HESS-BRIGHT MFG. CO.

Axles, hubs and rims

PHILADELPHIA, Pa., Jan. 18—The Hess-Bright Mfg. Co. was organized in 1904 by Fred E. Bright, president of the company, and Henry Hess. It always has been located in Philadelphia, but has only occupied its present location for the last 2½ years. The factory now is situated on grounds about 14 acres in area, along the main line of the Pennsylvania Railroad to New York. The company has expended considerable money in beautifying its grounds, and the wide sweep of lawns around the buildings, together with the flowers, shrubbery and shade trees, make a very beautiful appearance in the summer time.

It is at present building an addition to the factory to take care of the increased demand for Hess-Bright ball bearings.

It may be of interest to the trade to know that the company have received from Germany since the middle of September approximately 300,000 bearings.

From present indications it has every reason to believe that for the motor car industry the year 1915 will be one of unusual prosperity.

KOKOMO ELECTRIC CO.

Magnetos, spark coils, plugs and switches

KOKOMO, Ind., Jan. 18—The Kokomo Electric Co. started in business in 1904, being incorporated under the laws of the state of Indiana November 23, 1904. Those who were chiefly interested and the principal stockholders at the time of incorporation were Charles T. Byrne and James F. Ryan of Chicago, George Kingston, J. W. Johnson and J. P. Grace of Kokomo, Ind. All of the above named are stockholders at the present time, with the exception of James F. Ryan, deceased.

The original capitalization was $12,000. On June 25, 1907, it was increased to $25,000, and on October 26, 1911, was further increased to $150,000, which is the present capitalization. The present officers of the company are: Charles T. Byrne, president; George Kingston, vice-president; J. P. Grace, secretary; J. W. Johnson, treasurer, and Fay Beal, electrical engineer.

The company was formed originally for the purpose of manufacturing spark coils, spark plugs and timers for gas engines. In 1908 the manufacturing of timers was discontinued and the manufacturing of magnetos started. The yearly business of the company has shown large increase yearly since the beginning, the sales for 1914 amounting to approximately $1,000,000.

The percentage of increase in yearly sales has been as follows: Increase for 1906 over 1905, 340 per cent; 1907 over 1906, 27 per cent; 1908 over 1907, 265 per cent; 1909 over 1908, 8 per cent; 1910 over 1909, 6 per cent; 1911 over 910, 27 per cent; 1912 over 1911, 70 per cent; 1913 over 1912, 4 per cent; 1914 over 1913, 21 per cent.

The company originally operated in a small frame building in the northern part of the city of Kokomo. The original site still is retained although the original building was removed several years ago to make room for new factory buildings. Additional ground was purchased and new buildings erected from time to time until the present buildings occupied face on Webster, Courtland and Scott streets. The number of employes at the present time is approximately 500.

RACINE RUBBER CO.

Manufacturer of motor car tires

RACINE, Wis., Jan. 16—The Racine Rubber Co. was organized in March, 1910, by Captain William Mitchell Lewis, of Racine, Wis., who is well known in the motoring world as the founder of the Mitchell-Lewis Motor Co., and also of the L. P. C. Motor Co., builder of the Lewis six. Captain Lewis was assisted in the organization and construction of the plant by Charles F. U. Kelly, a veteran in the tire trade, and the company originally was named the Kelly-Racine Rubber Co.

A large and modern factory was erected at Racine Junction, Wis., and the manufacture of motor car and bicycle tires and accessories started in 1911. The first year of operation did not prove successful and in 1912 Captain Lewis and his father, W. T. Lewis, came to the rescue of the company and added a further large amount of working capital, and G. B. Wilson, then vice-president of the Mitchell-Lewis Motor Co., took charge of the business as president and general manager. To avoid confusion with another well-known tire company, the name was changed at this time to Racine Rubber Co.

During the past 3 years the business of the company has increased, net sales for the year just closed having been over $2,500,000, and earnings about $600,000. On January 2, 1915, the eleventh quarterly dividend of 1¾ per cent on the preferred stock was paid and in November, 1914, a 50 per cent stock and 1½ per cent cash dividend was paid on the common.

The capacity of the factory has increased from 100 tires per day in 1912 to 1,000 per day in 1915. About 600 men are employed during the busy season. The outlook for the present year is excellent and it is estimated that the volume of business will increase 50 per cent over the past year.

AMERICAN BALL BEARING CO.

Maker of front and rear axles

CLEVELAND, O., Jan. 16—In December, 1895, when the motor car was a dream, the American Ball Bearing Co. was organized here with a capital stock of $15,000 to manufacture ball bearings. The principal buyers were the bicycle makers. The original factory had 35,000 square feet of floor space and about forty men were employed.

Within a half decade, the bicycle had started to coast down the hill of oblivion and the motor car was on the upgrade to popularity. There was a demand for axles and the American company undertook their manufacture in 1900, when between 200 and 300 were made and sold, and at the same time started to perfect anti-friction bearings.

Fifteen years have elapsed since the American company started to cater to the motor car industry and each year has been a year of growth. The first factory long has been a thing of the past. The present plant has been enlarged three times and now has 286,000 square feet of floor space. Employment is given to about 400 men. The capital stock of the concern has been increased to $1,000,000.

BYRNE, KINGSTON & CO.

Kingston carbureters and mufflers

KOKOMO, Ind., Jan. 8—Byrne, Kingston & Co., a corporation organized under the laws of the state of Indiana, was incorporated in February, 1914. The officers and stockholders at that time were: President, George Kingston; vice-president, James F. Ryan; secretary and treasurer, C. T. Byrne.

The company started in a very small brick structure, which was on the site of the present plant. At that time there were only twelve men employed. The business since that time has grown very rapidly, so that now the company is occupying a building which is approximately one block square and employs about 400 men. Last year the company erected on the original site an office and

general administration building costing approximately $30,000.

The approximate sales for 1904 were about $20,000; for 1905 about $45,000; 1906, $70,000; 1908, $75,000; 1909, $149,000; 1910, $250,000; 1911, $286,000; 1912, $353,000; 1913, $410,000; 1914, $445,000.

The company was organized originally to manufacture carbureters, circulating pumps, mufflers and other gas engine accessories. In the last 3 years, however, all of the goods with the exception of the carbureters have been dropped from the line.

WHEELER & SCHEBLER

Manufacturers of Schebler carbureters

INDIANAPOLIS, Ind., Jan. 16—George Schebler, the inventor of the Schebler carbureter, was by trade a violin maker. Early in the gas engine industry he became very much interested in the development of the gas engine, and built what is said to have been the first gas engine ever operated in a conveyance in Indianapolis. After building this engine, in an endeavor to make it run successfully, he built the carbureter which was the nucleus of this business. After offering it to a number of his friends for development, he became acquainted with F. H. Wheeler, who was at that time a traveling salesman. Mr. Wheeler financed the business and was responsible for the development of the business. Mr. Wheeler and Mr. Schebler continued as partners in the business up to about a year ago, when Mr. Wheeler bought from Mr. Schebler his interest in the business, Mr. Schebler retiring, leaving the entire business owned and controlled by Mr. Wheeler.

Mr. Schebler at the present time spends most of his time on his farm in the southern part of this state. He is a great lover of outdoor sports and besides having a number of different makes of cars, he has one roadster which he had built for himself, designing and superintending the building of the motor, which is an eight-cylinder V type motor, which he has been using for the past 2 years.

The growth of the company owing to Mr. Wheeler's efforts, has been remarkable, having grown from a production of about 500 instruments a year to 300,000.

CORCORAN LAMP CO.

Manufacturer of motor car lamps

CINCINNATI, O., Jan. 18—The Corcoran Lamp Co., of this city dates back to 1840 when Thomas H. Corcoran started the manufacture of carriage lamps. With the business firmly established, he retired in 1895 in favor of his son, Thomas J. Corcoran, who now is the moving spirit. The son soon after built a large plant at Norwood, O., which later was disposed of because of the inconveniences connected with the location. The new plant was established on Reading road in this city, 22,500 square feet of space being used. Since 1905 the company has built additions and now it occupies 77,500 square feet.

In 1905 the company took up the manufacture of motor car lamps and succeeded so well that 2 years later it abandoned the carriage lamp business. In busy seasons 300 workmen are employed and last year the company turned out 25,000 pairs of motor car lamps, a production which it is in a position to double this year.

GURNEY BALL BEARING CO.

Manufacturer of ball bearings

JAMESTOWN, N. Y., Jan. 18—F. W. Gurney, chief engineer of the Gurney Ball Bearing Co., dates back to 1901 in the manufacture of this most important part of the motor car. The company was organized in 1903 and ran along smoothly until March 1910, when a fire destroyed all the equipment in the plant. It proved a blessing in disguise, for it was necessary to buy new equipment which was in keeping with the needs of the business as developed by Mr. Gurney.

The company is proud of the fact that it has contributed to the industry the radio-thrust bearing, while another important development is the Gurney system of speed rating which gives for each bearing a speed rating as well as a load rating. The speed and load ratings go together; a change in load changes the speed rating and vice versa. Thus, the company gives a chart in the form of a low-speed curve by which it is possible to determine what load any bearing may carry at any given speed, or what speed any bearing may run under any given loads.

THERMOID RUBBER CO.

Maker of Thermoid brake lining and Nassau tires

TRENTON, N. J., Jan. 18—Numbering its years of achievement by more than 30, the Thermoid Rubber Co. was conceived and financed by the Stokes family, pioneers in American rubber manufacture, and today its destinies are directed by Robert J. Stokes, grandson of the founder of the concern and the present secretary and general manager.

The Thermoid company is a Stokes' enterprise exclusively. It never has asked for or taken in any outside capital, and during a 30-year period has grown from a small plant to one of the largest manufacturers of hard rubber, such as battery jars, rods, disks, etc., in the country and also is recognized as one of the leading rubber mills in the manufacture of mechanical rubber, asbestos products, motor car tires and accessories.

Trenton is known as the home of the rubber industry in America. Prior to the motoring era it produced 90 per cent of the rubber goods in this country and today is second in the manufacture of mechanical and motor car rubber products.

The company entered the motor accessory industry in 1905, when Thermoid hydraulic compressed brake lining was invented and patented, this being the first form of asbestos wire, inserted brake lining to be used, it is claimed, and today the manufacture of this brake lining runs into millions of feet annually.

The manufacture of tires naturally followed, and in 1900 the first casings were produced. After a year of experimental work, the company started the manufacture of Nassau tires, and their popularity has grown until now it is building them at the rate of nearly 1,000 per day, and the facilities here are being gradually expanded to keep pace for the constantly increased demand.

ELECTRIC STORAGE BATTERY CO.

Manufacturer of Exide batteries

PHILADELPHIA, Pa., Jan. 18—The Electric Storage Battery Co., which is well known in the motoring world because it manufactures Exide batteries, dates back to June 5, 1888. It owes its origin to the fact that the year previous Clement Payen, a Frenchman, brought to this country a storage battery that was a radical departure from the prevailing types. He interested Philadelphia capital, a company was formed, factory secured and the new battery, known as the chloride accumulator, was placed on the market.

In 1896 the company noted the development of the electric vehicle and anticipating the demand for a special type of battery that would combine lightness with strength and capacity with durability. This resulted in the marketing of the Exide in 1900. Later developments in batteries for electric vehicle service placed on the market the Hycap-Exide, the Thin-Exide and the Ironclad-Exide, the last named appearing in 1911.

The business of the company has developed to the extent that at the present time its plant consists of twenty-three separate buildings, the floor space in the buildings amounting to more than 12½ acres.

DETROIT STEEL PRODUCTS CO.

Self-lubricating springs and steel windows

DETROIT, Mich., Jan. 18—The Detroit Steel Products Co. was organized in 1906 and its location always has been in Detroit. John G. Rumney is general manager of the company and has been the active head since its organization. Its annual output is approximately $2,000,000. During the past 4 years the company has increased until now it is five times as large as it formerly was. This company manufactures Detroit self-lubricating springs and Fenestra solid steel windows.

AJAX-GRIEB RUBBER CO.

Manufacturer of Ajax-Grieb tires

NEW YORK, Jan. 16—At a meeting in Chicago in November, 1905, the Ajax Standard Rubber Co. was organized with $100,000 capital. The first officers were Horace De Lisser, president, secretary and

treasurer, and L. P. Destribats, superintendent, and the directors, Horace De Lisser, R. A. Patteson, president of the Tarrytown National Bank, and Roger B. McMullen.

Operations were begun early in 1906, and on January 12 the first Ajax tire was completed in the plant then located at One Hundred and Sixth street and East river, in New York city.

On September 8, 1906, the Ajax-Standard Rubber Co. was amalgamated with the Grieb Rubber Co., of Trenton, N. J., the business then being known as the Ajax-Grieb Rubber Co. The capital stock was increased to $200,000 preferred, $200,000 common, $400,000 total, and the officers of the new company were: Horace De Lisser, president; William G. Grieb, vice-president; Harry Grieb, treasurer, and C. H. Oakley, secretary.

The first Ajax tires to be made in Trenton were completed in January, 1907, and the plant in New York city was abandoned. The first occupied Trenton plant soon proved to be too small for the climbing Ajax product, and during the panic of 1907 a new factory was being built. This was dedicated May 11, 1908.

To this new factory opened in 1908 there have been added three new brick buildings, and much new rubber handling and tire-making machinery. During the past few months the Ajax company retired from manufacture of rubber druggist sundries that it might devote all of its activities to the manufacture of motor car and motorcycle tires.

When manufacture of Ajax tires was first begun in 1906 the employes numbered but sixteen, including Mr. De Lisser and Mr. Destribats. In February, 1911, 24 hours' operation in three shifts was begun and has continued since without curtailment or shutdown. Today the Ajax business is the second largest employer of labor in Trenton, more than 1,000 hands being employed.

The growth of the Ajax business is told in its yearly volume. For the first 8 months ending September, 1906, the total was $118,000; the second year, ending September, 1907, $550,000; third year ending September, 1908, $550,000; fourth year ending September, 1909, $1,000,000; fifth year ending September, 1910; $2,000,000; sixth year ending September, 1911, $3,000,000; seventh year ending September, 1912, $3,700,000; eighth year ending September, 1913, $4,800,000; ninth year ending September, 1914, nearly $6,000,000.

In 1909 the capital was increased to $1,000,000 through earnings, and not through the sale of additional stock. After paying liberal dividends, the Ajax-Grieb Rubber Co. now is employing capital considerably over $2,000,000.

The interest of Harry Grieb was purchased by William E. Grieb and Horace De Lisser in 1910, at which time Horace De Lisser became chairman of the board of directors; William G. Grieb, president; L. P. Destribats, vice-president; J. C. Matlack, secretary, and Harold W. Stimpson, treasurer, these officers continuing at this time.

BREEZE CARBURETER CO.

Maker of carbureters and flexible tubing

NEWARK, N. J., Jan. 16—The Breeze Carbureter Co. was preceded by a concern which made a motorcycle which was exhibited at one of the first of the New York shows. Seeking an investment, Colman S. O'Loughlin took over the concern. In 1907 it began to show progress and since then it has been making giant strides. Twice in 3 years the company has had to move to get room for its manufacturing activities. The first year O'Loughlin was at the helm the business done amounted to only $5,000, but in 2 years this had been increased to $45,000. Since then the business has increased about 100 per cent until now it is close to the $100,000 mark.

HARRISON MFG. CO., INC.

Maker of Harrison radiators

LOCKPORT, N. Y., Jan. 18—The Harrison Radiator Co., of Lockport, N. Y., was incorporated August 29, 1910, with local capital, by Herbert C. Harrison, consulting engineer, and Byron V. Covert, a successful transmission manufacturer of this city. The old plant of the Covert Motor Vehicle Co. was utilized and a special tubular radiator of very simple construction, the invention of Mr. Harrison, at first was put upon the market.

From the time of incorporation, 2 years were spent exploiting this tubular radiator, with a view principally to the truck makers' requirements, and many of these radiators were sold, among others, to the Gramm Motor Truck Co. and the Feneral Motor Truck Co.

In the fall of 1912 a hexagon cellular radiator was invented by Mr. Harrison and the company was reorganized with fresh capital, changing its name to the Harrison Mfg. Co., Inc., leasing new premises, which afforded considerable room for expansion, and ample facilities for the existing requirements.

EISEMANN MAGNETO CO.

Manufacturer of Eisemann magnetos

BROOKLYN, N. Y., Jan. 18—The first Eisemann high-tension magnetos were manufactured by Ernst Eisemann, of Stuttgart, in 1899, 16 years ago; Mr. Eisemann also manufactured spark plugs. Mr. Eisemann, therefore, is a pioneer in the manufacture of magnetos and was the first, it is claimed, to manufacture a direct high-tension magneto, as well as a high-tension system with separate transformer coil, it is claimed.

In the latter part of 1906 the Eisemann magneto was introduced in the United States by Lavalette & Co., with headquarters at Paris, and which maintained a selling agency for Eisemann magnetos until 1910, when the Eisemann Magneto Co. was incorporated for the manufacture of Eisemann magnetos in this country. Richard Kny, president of the Kny-Scherer Co., was the president and moving spirit in the new concern. In accordance with the tendency of the times, it was decided, in order to reduce the cost of the Eisemann magneto, to begin manufacturing in this country, and after much consideration, it was decided that the Bush Terminal Co., Brooklyn, offered such manufacturing facilities, that the company decided to locate there, in Building No. 3. This was about the middle of 1910.

In September, 1912, the company requiring more room, moved from Building No. 3 to Building No. 8, where it is now located, and where it employs 400 men. Since the formation of the Eisemann Magneto Co., in January, 1910, the sales in this country have increased over 300 per cent. The output for the fiscal year, July 1, 1914, to July 1, 1915, will exceed 60,000 magnetos, besides the dual ignition coils, switches, couplings and a few other accessories which are closely allied with ignition.

UNITED STATES TIRE CO.

Maker of motor car tires

NEW YORK, Jan. 18—The United States Tire Co. was formed in 1911 to take over the marketing of four of the oldest and best known brands of tires—the Morgan & Wright, made at the Morgan & Wright factory, Detroit, Mich.; the Hartford, manufactured by the Hartford Rubber Works Co., Hartford, Conn.; the G & J, made by the G & J Tire Co., Indianapolis, Ind., and Continental, made by the Revere Rubber Co., Providence, R. I.

Almost immediately steps were taken to concentrate the production of these factories and their most valuable features on one brand, the United States brand, which took the place of the four brands previously made, except G & J, which is retained for an exclusive list of agents, but is not handled through the regular United States branches. Practically all four of these factories were making complete lines of tires at that time, including the most important item, motor car tires, also tubes, and bicycle, motorcycle and solid motor truck tires.

The concentration on the one brand, United States, has been most successful. The additions to the Detroit plant alone have increased the capacity of the United States Tire Co. to more than double the former capacity of the four plants.

The entire motor car tire production is concentrated in the Detroit and Hartford plants. All solid tires for motor trucks, carriages, and vehicles of all sorts are concentrated in Providence. Bicycle and motorcycle tires are made exclusively at Indianapolis. Each of these plants specializes on its own particular line.

Rene Thomas to Drive at Indianapolis This Year

Frenchman, Out of Army, Going in 500-Mile Race

INDIANAPOLIS, Ind., Jan. 19—Rene Thomas, winner of the 1914 500-mile race on the local speedway, will defend his international honors this year and will be a contestant in the fifth annual sweepstakes.

The local management has received word from Thomas to the effect that he could be counted on as a positive starter, he having been excused from military service because of injuries received while operating an aeroplane. At once Thomas notified the Hoosiers, who now are waiting for a cable from him specifying the car he will drive.

It also is expected that Arthur Duray, runner-up last year, also will cross with Thomas, for he, too, has been injured in military service and has been released from army duty. W. F. Bradley writes that Thomas and Duray are the only two continental drivers who can be looked for for the big American race.

OLDFIELD ABANDONS SPEEDWAY

Los Angeles, Cal., Jan. 13—Barney Oldfield announced today before the members of the Venice grand prix race committee that the Los Angeles speedway, of which project the veteran driver is to be the leading promoter, will not materialize this spring and Oldfield pledged his support to the Venice race and will continue as an active member of the committee.

The San Diego race January 9 crowded the Venice event back beyond the Vanderbilt and grand prix events to be held in San Francisco next month and the Venice sanction was secured before the speedway projectors could file an application for a date soon after the San Francisco races. With the Venice race scheduled for March 17, it was decided by Oldfield and his associates that the racing game would be overdone in Southern California this season if any attempt was made to stage a race between the Venice classic and the 500-mile race on the Indianapolis speedway, so Oldfield and his associates joined forces with the Venice management.

The profit-sharing plan suggested by Oldfield for the drivers has been adopted by the Venice officials and the drivers are to receive the entire net profits of the race, which should make the purse one of the largest ever offered in the United States. There is a guaranteed purse of $8,000, and all the net profits being added, the St. Patrick's day event should prove as attractive financially to the drivers as any other race ever staged.

According to Oldfield, this is the first time in the history of the motor racing sport that a driver has been offered the opportunity to share in the profits of his own performance.

Oldfield and Earl Cooper are the first entries for the Venice race. Both drivers signed entry blanks at San Diego last Saturday. Both stars entered at the same time, but Oldfield takes entry No. 1, Earl Cooper having reserved his old number 8.

ANTI-HEADLIGHT LAW WITHDRAWN

Philadelphia, Pa., Jan. 15—The Fairmount park commissioners at their monthly meeting rescinded the regulation put into effect on November 15 under which headlights have since been prohibited in the park. Following the adoption of the rule 2 months ago protests from motorists poured in to the members of the commission, and many drivers had adopted the scheme of covering the sides of their lights, which had a tendency to reflect in pedestrians' and other drivers' eyes at an even higher level than previously. Many attempts have been made to have the rule modified or abolished and its inforcement was difficult. Many motorists frankly refused to abide by the rule, protesting that absence of lights on some of the dark drives was far more productive of trouble than the objectionable glare.

Under the amendment now in force searchlights may be used on all motor vehicles on the drives in Fairmount park provided reflectors or condensed lenses are so attuned as to shed the rays of light a distance not exceeding 200 feet ahead of the automobile.

The commission also adopted a rule requiring horse-drawn vehicles traversing the park drives to carry a light on each side visible at a distance of 200 feet.

NEW NATIONAL PARK

Washington, D. C., Jan. 18—The house today passed the senate bill providing for the creation of the Rocky Mountain National park. The new park is near Denver and includes Long's peak. It has an area of approximately 700 square miles, which included canyons, mountain lakes, valleys, and mountain parks.

The new park also includes Estes park, which recently has been visited annually by 30,000 tourists.

"There is no predominant commanding natural feature in Estes park such as is found in the Crater lake, the Yellowstone, or the Yosemite, or along the Grand Canyon of the Colorado, but the region as a whole is as beautiful as any to be found in the world," says a government report. "There is spread before the eye a gorgeous assemblage of wonderful mountain sculpture, surrounded by fantastic and ever changing clouds, suspended in an apparently atomless space. At first view, as one beholds the scene in awe and amazement, the effect is as of an enormous painting, a vast panorama stretching away for illimitable distance. Gradually this idea of distance disappears, the magnificent work of nature seems to draw nearer and nearer, reduced apparently by an unseen microscope to the refinement of a delicate cameo. Each view becomes a refined miniature, framed by another more fascinating, the whole presenting an impressive picture, never to be forgotten."

The new park probably will be connected with the municipally owned Denver Mountain park by a motor road 30 miles long flanked on either side by a parkway.

JERSEY MAY INCREASE SPEED

Philadelphia, Pa., Jan. 16—State Commissioner of Motor Vehicles Lippincott, of New Jersey, in his annual report to Governor Fielder has recommended that New Jersey follow the lead of New York and other states by increasing the speed limit to 30 miles an hour in the open and 15 miles in towns and cities, as in his opinion many drivers of motor cars violate the present speed regulations.

WILLYS SELLS GRAMM STOCK

Lima, O., Jan. 18—According to an announcement made January 17, John N. Willys has withdrawn from the Gramm Motor Truck Co., of Lima, of which he gained control several years ago by purchasing more than $500,000 of the $750,000 common stock of the corporation. The capital of the company is $1,250,000.

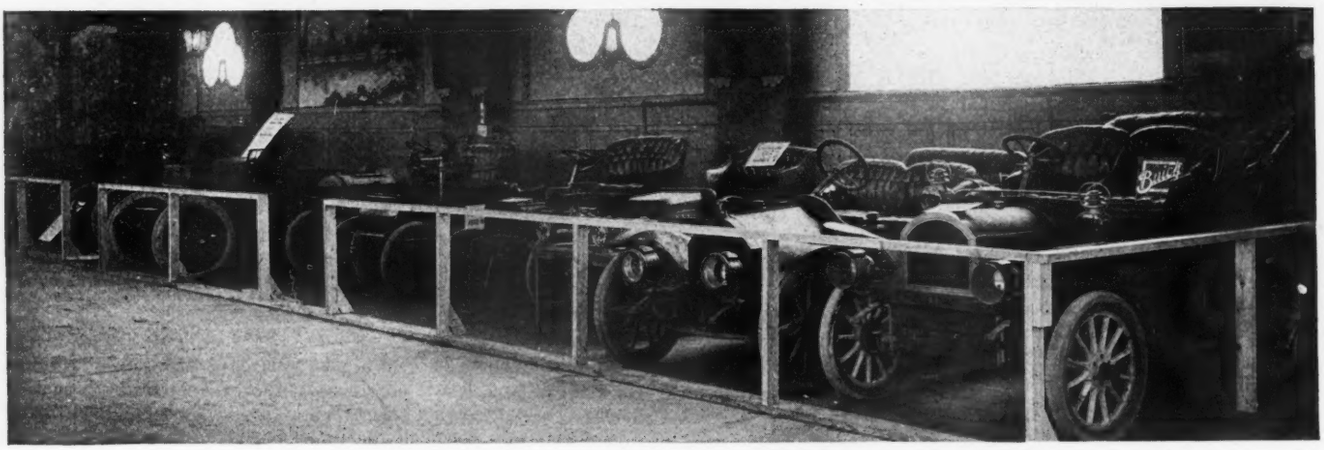
The Geiger-Jones Co., of Canton, widely known as industrial bankers, will be the dominant factor in the reorganization of the company. The banking company has acquired from Mr. Willys all of his interests and a meeting was held with the Lima stockholders. E. A. Williams, Jr., formerly in charge of the Lima plant for the Willys-Overland company and later with the same people in New York will return as manager of the manufacturing department.

STUDENTS BUILDING ARMORED CARS

Chicago, Jan. 18—Ten military motor cars are being constructed by the students of the Northwestern Military and Naval Academy at Lake Geneva, Wis., and sometime in June or July this motorcade will be driven from Chicago to the Pacific coast for the purpose of demonstrating to the government the utility of this type of gasoline-propelled vehicles. Officers from the United States army will accompany the students and altogether it will be a most important tour. The students are designing ten military cars—one an armored car; two balloon-destroying cars; two wireless cars, one field kitchen, one ambulance and field hospital combined; one officer's reconnoisance car; one car for the transportation of light field artillery and one engineer's car.

Detroit's Big Exhibition a Motor Show of Major Caliber

More Than 200 Different Passenger Cars Displayed—Trucks Also Shown



OLD CARS LINED UP IN MOTOR MUSEUM AT DETROIT SHOW

DETROIT, Mich., Jan. 16.—With more than 200 different models of passenger cars, commercial vehicles and chassis for both of these classes of vehicles on the three floors of the huge building of the Detroit Lumber Co., the fourteenth annual show organized by the Detroit Automobile Dealers' Association was ushered in amid a blaze of light and beautiful decorations the like of which never have been seen in the motor metropolis of the world. And before going into the details it might be quite appropriate to say that it is the best show, in any way one looks at it, which has been staged in Detroit. Best in size, in decorative scheme, in good light, in arrangement of stands and spaces, and, above all, in being ready at the announced time for the opening.

The public came by the thousands tonight, notwithstanding the bad weather. In fact, the crowding was such that extra police had to be called.

Trucks Also Displayed

The entire first building is given over to the commercial vehicles, with the exception of a small wall space where a large hydroplane and some motor boats are neatly displayed. The decoration of this floor is purple and gold and yellow with an abundance of wisteria. The second building, which is reached by going through a short passageway, having mural paintings resembling to a grotto, is devoted to the passenger cars, which occupy two floors. The first floor resembles a Japanese garden, with creeping vines, flowers and birds. Like in the commercial car building, the light is furnished by thousands of lamps and is the best ever provided at a local show. The second floor is what might be termed the Lincoln highway, as the walls are covered with panels representing various scenic features which the traveler along the route will encounter in the different states from coast to coast.

A rapid survey made before closing time showed that there were all told 203 cars and chassis on the three floors tonight. There were 178 belonging to the gasoline class and twenty-five to the electric division. In the first of these two classes there were 119 passenger cars and fifteen passenger chassis; thirty commercial cars and thirteen chassis; one special-built gasoline war vehicle; of the twenty-five electrics nineteen were passenger cars and one a passenger car chassis; three were electric commercial vehicles and one a chassis and one was an electric taxicab.

Several new passenger and commercial cars were shown for the first time tonight.

Wilson Shows New Truck

The J. C. Wilson Co., which only recently started to make trucks, has added a worm-driven model. It is a 1½-ton vehicle identical otherwise in general construction with the double-chain driven model. The torque is taken by springs and the propulsion also is by springs, while the total gear ratio is 7.7-1. The size of the front tires is 37 by 3½ inches and the rear tires are 37 by 5 inches. The price is $1,800.

The Dominion truck, which is shown for the first time at any show, is made by the New Dominion Motors, Ltd., of Walkerville, Ont., and by the Dominion Motor Truck Co., which has just been organized in Detroit. In reality it is a combination truck and trailer, having a Continental motor 4½ by 5½, Schebler carbureter, multiple-disk clutch and Atwater Kent ignition. The transmission is of the sliding-gear selective type with three speeds forward and combined with motor and clutch and forming a complete unit power plant. The overall length is 19 feet and 6 inches, the wheelbase of the tractor being 68 inches, trailer with 12-foot body 89 inches. The total weight, including body, is 8,585 pounds, of which 2,310 pounds is on the front tires, 3,450 on center tires and 2,825 on trailer tires.

The frame of the tractor is a channel section 6 inches deep and the sub-frame is of larger channel section pivoted to main frame in front and suspended by springs from the rear axle. The front axle of the tractor is a Sheldon I-beam section fitted with taper roller bearings; the rear axle is a Sheldon worm drive and the trailer axle a Sheldon drop forge steel with roller bearings. The radiator is tubular, water being circulated by a centrifugal pump. The steering gear is semi-irreversible.

The tractor front springs are semi-elliptic 40 inches long, 2½ inches wide, while the rear are 48 long and 3 wide; those of the trailer are 54 inches long and 3 inches wide. The truck tires are 36 by 4 on the front and 36 by 4 dual on the rear, while the trailer has 40 by 6-inch tires. The trailer's capacity is up to 6 tons and the price with lamps, electric headlight, inside dashlight, horn, tools, etc., is $3,800.

Denby in Two Models

The Denby Motor Truck Co., which has been making a 1,500-pound and a 2,000-pound truck, has added two models, one a 3,000-pound truck and the other a 4,000-pound model. They both have a Continental motor 3¾ by 5, cast in block, and L head. The carbureter is a Stromberg, ignition is Eisemann. The starting system is Westinghouse and the lighting Kemco. The wheelbase is 144 or 160 inches, this being optional. The 3,000-pound truck has front tires 34 by 3½ and rear tires 36 by 8, while the 4,000-pound truck is equipped with tires 34 by 4 on the front wheels and 36 by 7 on the rear wheels, or 36 by 3½ dual. Russell axles are used on both models, which also have left steering and center control. The price of model D, or the 3,000-pound truck, is $1,900, while model E, or the 4,000-pound model, is listed at $2,100.

The International, made by the International Harvester Co., is shown for the first time here and is a new truck with the concern, selling at $1,150, with a ca-

pacity rating of 1,000 pounds. It has two opposed cylinders of L-head type 4½ by 5 and giving 20 horsepower. The wheelbase is 102 inches and 38 by 2½ front tires along with 38 by 3 rear are used. Other specifications include a cone clutch, Heinze magneto and Holley carbureter.

In the passenger car list practically the only vehicle seen here which has not been on view in New York, or is not to be shown at Chicago, is the little two-passenger car built by the States Cyclecar Co., of Detroit. This concern has been getting underway for some time and now is entering the selling field. The States car has a 2⅜ by 4 motor of four-cylinders cast in a block and rated at 10-15 horsepower. The tread is 36 inches, wheelbase 90 inches and the wheels are wood, carrying 28 by 3 tires. The body is a trim affair and the cowl slopes to the hood. Seats are side by side, drive on the left and control in the center. The gasoline tank is under the cowl. The price of the States equipped is $365. The concern expects to get into active manufacturing at once.

A noticeable reduction in price is found in the R. C. H., which, though practically the same in general construction as it was, is reduced from $900 to $775. Electric starting and lighting by the Ward Leonard system adds $75 extra to the latter price, making it $850.

Debut of Storms Electric

The Storms electric passenger cars, which are made by the Storms Electric Car Co., Detroit, are shown for the first time at any show. The roadster is listed at $750 and the coupe at $950, both having a chassis.

The Storms Electric Car Co., which recently was organized here, is showing its electrics for the first time. There are two models, a roadster listed at $750 and a coupe at $950, and they are claimed to be the lowest priced electric passenger vehicles on the market. They are neatly made, having Reiss & Ball bodies, wheelbase of 90 inches and tread 44 inches.

Another car which is shown for the first time at a show is the two-passenger Princess, made by the Princess Motor Car Co., of this city. With electric lighting and starting system the car sells at $495, fully equipped. The motor is a four-cylinder block 2¾ by 4, L head. The carbureter is a Holley, the ignition Bosch. The transmission is a Warner selective sliding with three speeds forward. The wheelbase is 92 inches and the tread 44. The body is of the Renault type.

One of the features of the show is the Packard specially built war car, similar to those which were ordered from the big Detroit manufacturers by some foreign governments recently. It might almost be described as a motor-propelled fortress, as it has a turret in which a quick-firer is mounted. The driver and those to go along with the car are completely protected by a steel wall.

An innovation at the show is the motor car museum, and it would not be surprising if the local promoter's idea will be imitated in this respect. Instead of having early models shown in the manufacturer's stands all the historical machines are shown together here. This has decidedly added interest to the exhibit. The good old cars of 15 or 20 years ago which are on in the museum are the first Oldsmobile, made in 1895; the first Hudson made in 1898; the first model A Packard, made in 1899; the first model I, Overland, built in 1902; a Pierce-Arrow also built in 1902; the Winton Bullet racing car No. 2; one of the earliest-made Winton passenger cars; a Hupmobile with which a trip around the world was made and which covered 40,000 miles; one each of the first Buick, Mitchell, Detroit electric and Baker electrics.

MILWAUKEE FINANCIAL SUCCESS

Milwaukee, Wis., Jan. 15—When Milwaukee's seventh annual show closed last night, officials of the Milwaukee Automobile Dealers' Association declared that it is the greatest financial success the promoters ever have experienced. An attendance of 42,000 compared with 36,000 at the 1914 show resulted in bigger gate receipts than ever before, while the number of exhibitors showed an increase, resulting in larger receipts for show space. The showing is exceptional because of the fact that the Milwaukee show is in many ways like a theatrical attraction, and theaters in Milwaukee have had good reason to complain about their reduced receipts for many months.

The attendance on Tuesday, January 12, was estimated at 12,400. It was "state day" and several important meetings of state associations of dealers and owners were held, which accounts for the remarkable crowd on hand. On Tuesday night the Milwaukee A. D. A. entertained the state dealers at a banquet in the Schlitz hotel and palm garden, at which more than 800 persons were served.

CLEVELAND SHOW OPENS

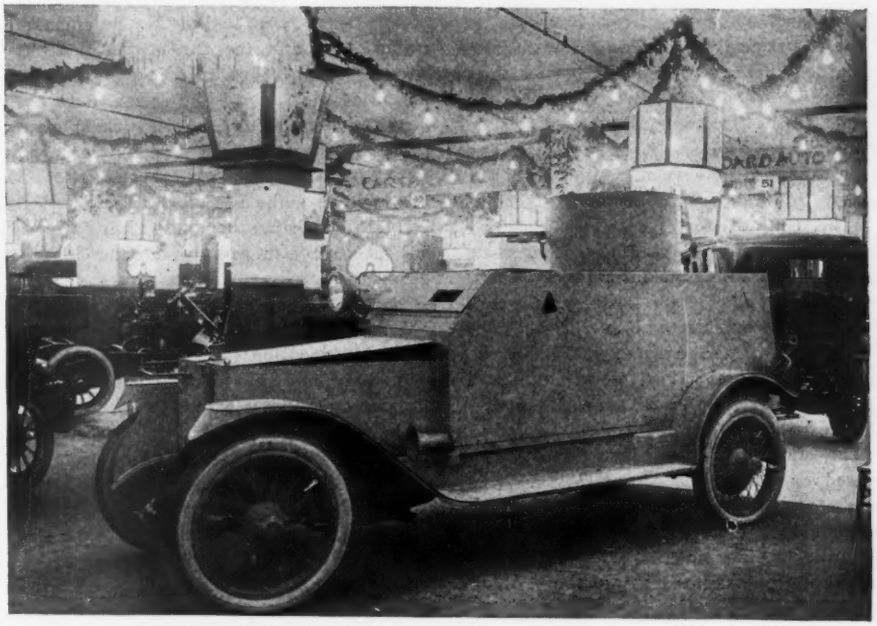
Cleveland, O., Jan. 16—Motor cars of every description and variety, scattered over an acre and a half of space, representing a value of $2,000,000; all of them banked in superb decorations with myriad lights as a setting—this is the impression of the Cleveland show, which opened Saturday at the Wigmore Coliseum and will continue through the week.

This coliseum contains 66,000 square feet and every inch of space is occupied. The decorative scheme represents the ancient Egyptian court of Thebes, containing numerous columns such as were designed by Artesan. There are more than 100 pillars painted to represent Caen stone, and the richness and splendor of it all exceeds any exhibition ever held in the coliseum.

PHILADELPHIA SHOW SUCCESSFUL

Philadelphia, Pa., Jan. 16—The show conducted under the auspices of the Philadelphia Automobile Trade Association in the Metropolitan building closed tonight after the most successful exhibition of its kind ever held in this city. Its three outstanding features were the all-around excellence of the exhibition itself, the enormous attendance and the volume of business transacted.

That exceptional interest was manifested in this year's exhibit is conclusively demonstrated by the box office receipts, which, while not announced, attained a total never before approached. Even the doubling of the price of admission on Thursday, had no appreciable effect on visitors, and the big floor was thronged afternoon and evening.



PACKARD ARMORED MOTOR CAR DISPLAYED AT DETROIT SHOW

Belgian Motor Factories Escape Ravages of War

Most of the Plants Able to Start Operations When Peace Is Declared

By W. F. Bradley

PARIS, Jan. 4—Belgian motor car and kindred factories are undamaged; their condition is such that if the war had to stop tomorrow work could be resumed with a minimum delay. I have been able to obtain this review of the situation in the invaded territory from a person holding an important position in the Belgian motor car industry and who has enjoyed unusual facilities for examining the industrial condition of the country. For military reasons my informant must remain anonymous.

Since mid-September Belgium has been a land of mystery. With the exception of a strip near the shore the country is held tight in the grip of the rugged German. Nobody can get in and it requires some ingenuity for anybody to get out. The few who have escaped bring with them local information. They have been numbed by bombardment or dazed by rapid movement; their range of vision is usually equal to that of a man down a shaft.

According to my informant the following motor car factories are intact: Minerva and Sava at Antwerp; Excelsior, Pipe, F. A. B., Miesse, F. I. F., at Brussels; Nagant, Imperia and the B. N. D. steel works at Liege; Springuel at Huy; Metallurgique at Marchienne-au-Pont; Dasse at Verviers. The railroad wagon department of the Germain company, at Monceau-sur-Sambre, was partly destroyed by a shell, but the motor car shops have not suffered in any way.

Situation at Liege

One of the most important motor car centers in Belgium is Liege. Here there were some marvelous escapes. The Derihon Bros. steel works, at which the famous B. N. D. steel is produced, are situated less than 500 yards from the fort of Loncin. Owing to their location it was imagined that the works had been utterly destroyed when this fort fell into the hands of the Germans. Doubtless this lot would have befallen it if the city had been taken in the normal manner. But the enemy broke down one of the strongholds in the ring of forts, got into the city through the gap, leaving the other forts standing. These, including the Loncin fort, were shelled from the inside instead of from the outside, and as the Belgians did not know the exact position of the German batteries, they were unable to reply effectively for fear of destroying their own city.

The staff of the Derihon factory witnessed one of the most spectacular bombardments the world ever has known. Some motor car engineers took up a position in a tower by the side of the fort. They could see the approach of the 12-inch shells and notice where they fell. So near were they to the line of fire that the tower trembled under the displacement of air as each shell went by. When the fort had crumbled up under the terrible bombardment, when the land around had been plowed by shells, some of which made holes 12 feet in diameter by 6 feet in depth, the factory remained without a scar. Within a few hours of the declaration of war, and before the German troops had penetrated far into Belgium, the enemy's aeroplanes passed over Liege dropping bombs. Two of these fell into a garden surrounding the house occupied by one of the engineers of the B. N. D. works, but as the family had just left no injury to persons resulted.

F. N. Declines to Help Germans

The F. N. factory near Liege came in for particular attention. In addition to producing the F. N. car and motorcycles, these works turn out vast quantities of arms, the full title of the concern being the Fabrique Nationale d'Armes de Guerre. The Germans obtained military possession of the whole of this district, including the ring of forts around Liège, without doing any damage to the ordnance and motor car factory. They were desirous of making use of this factory for their own purposes and negotiations were entered into with the management with this object in view.

All proposals that the Belgian factory should work for the German government were refused with indignation. When persuasion would not suffice, threats were resorted to, the director of the factory, M. Galopin, being put against a wall and threatened with instant execution if he did not place his services at the disposal of the Germany army. But M. Galopin remained firm and the threat was not put into execution. German officers then took charge of the factory and appealed to the workpeople to return, offering them more advantageous conditions than they enjoyed before invasion. Not a man replied.

Unable to make use of the factory, the German authorities began to ship the special machinery in the gun-making departments to Germany. When these departments had been stripped, many of the lathes in the motor car factory were sent across the frontier. According to the latest and most reliable information, however, the motor car shops are not in a very bad condition.

Destruction has been carried out on methodical lines, and it is one of the hazards of war that the motor car factories of Belgium have not stood in the path of the method. Louvain was razed to the ground. That served as a warning and an example to Brussels a few miles away to the west and the city surrendered without opposition. Louvain was sacrificed, but the whole of the commercial and industrial interests of Brussels were safeguarded. Thus, at the present time the whole of the motor car interests in and around Brussels are intact.

Not only have the Belgian motor car factories escaped destruction, but the foundries and forges specializing in motor car work are practically all undamaged. I have definite information that Charleroi, which supplies immense quantities of castings and forgings to the motor car factories of France and England, has suffered but slightly. That these classes of works should have escaped is more important than that the motor car factories should have been spared. It means that as soon as the war comes to a close—providing of course no damage is done in the meantime—work can be resumed without delay. Staffs have been scattered, many of the work people are in England, more are in France, and a certain number have disappeared. Despite this, the heads of industrial organizations have been able to keep in touch with their men and can call them together at very short notice as soon as conditions are ripe for a resumption of work.

A strong effort has been made on the part of the Germans to keep manufactories going. The owners of factories have not only been advised, but in many cases ordered to open up and run as if nothing had happened. Every encouragement is made to do business with neutral countries. As an instance, I am informed by a foundry master that this month he shipped a big consignment of castings to an important motor car factory in Italy. The goods were carried on a German military train and everything possible done to expedite their delivery.

Encouraged by Germans

The evident intention of the German authorities is to restore the country they are now holding to as prosperous a condition as possible and to reconcile the Belgians to German rule. To be able to point behind their line of troops to a prosperous country working under German protection would be a valuable object lesson to neutral countries and would be calculated to offset the charges of brutality levied by the allies. The Belgians, however, refuse to respond to this move. The working classes will not look upon the German troops otherwise than as murderous invaders and prefer exile and poverty to the Germans' promises of steady employment.

The directors of manufacturing establishments have an interest in responding to the German invitation, but at the same

time anything like an approach to normally prosperous conditions would mean advantage to the enemy. Thus they are complying with the letter of the law by opening their works, but production is kept so low as to be a really negligible quantity. At such a time as the present irrefutable arguments can be produced showing why production cannot be carried on, and how even German labor would not solve the many difficulties. In this way the nucleus of an organization is maintained and manufacturers are willing to await the deliverance which they believe the allied troops will bring at no distant date. It is reported that the Minerva factory has been seized and manned by Germans who are producing material for the German army. So far as can be learned, this is the only motor car factory so treated. The others have remained in Belgian hands and are of no material value to the invaders.

Belgian Cars Saved

The number of Belgian cars seized by the Germans does not appear to be large. In the first place the German army requisitioned immense numbers of private cars and manufacturers' stocks. When it was evident that the country was about to be overrun by German troops there was sufficient time to get the cars away, thousands crossing the frontier and finding refuge at Havre, where the Belgian government was offered temporary quarters. Railroad material was treated in the same way, all the locomotives and many of the freight cars being brought into France when it was probable that they would otherwise fall into German hands.

In addition to the wrecked towns and the destroyed church towers, many of them being brought down to prevent them being used as observation posts by the enemy, the appearance of many parts of the Belgian countryside has been entirely changed by the systematic destruction of roadside trees. This was ordered by the military authorities, evidently without due consideration, on the ground that the trees would be of advantage to the invading forces, while felled and laid across the road they would hinder their progress. The felling of the trees did not seriously interfere with the enemy's advance, and it has caused a loss to the countryside which cannot be replaced for generations.

Bradley Reports on Present Conditions in France

Ousting of Germans Makes Room for Americans

PARIS, Jan. 2—The French motor industry, which is one of the most important allies of the war department, has not up to the present been seriously handicapped either by lack of material or men. Where army contracts are in hand, the war department facilitates the task of the manufacturer by liberating from military service all the men necessary for this work. It is with the greatest difficulty, however, that the release of men can be obtained for the ordinary work of the factories. In consequence the factories have to be run by men who are free from military obligations, with in some cases the help of workmen from allied and neutral nations.

As the north and northeast portions of France now held by the enemy supply three-quarters of the raw material necessary for motor car construction, it is evident that factories have been and are somewhat inconvenienced. Aluminum castings can be obtained in any quantities; there is no shortage of brass work; forgings are obtained with a certain amount of difficulty. It is almost impossible to obtain big steel castings. Manufacturers, however, are not worried for the moment. There is a plentiful stock of raw material in the factories and in the stores around Paris, and other parts of France not affected or likely to be affected by the war, can be called upon for the material.

Factory managers declare they are more concerned in getting men than in securing material. Their viewpoint is that if they had all the men they could use they would soon find the material for them to work on. It is evident, however, that with a sudden rush of work, consequent on the cessation of war, there would be a shortage of material, for the foundries and forges cannot get into operation at a moment's notice. This situation would have to be met by foreign supplies.

Manufacturers consider that they would first turn to England, but if this country could not meet all the demands the United States would be a certain provider. Up to the present time the only supplies coming from America appear to be magnetos. There appears to be no doubt, however, that French manufacturers will be prepared to send orders across the Atlantic at a later date.

The ousting of German cars and accessories from the French market will leave an opening for American products. Patriotic feeling runs so high that it is certain few German goods can be offered for sale in France for years after the war. An important phase of this situation is that successful dealers who have hitherto handled German cars will be open to take other lines. Every American firm having tried to do business in France has been brought face to face with the difficulty of getting live dealers of good standing to take up their lines. The best men were tied up with French, Italian or German houses and would not undertake to do the missionary work necessary to put an American firm in good standing on the continent of Europe. Scores of American manufacturers have come to Paris to offer their agencies to successful French dealers and have had them refused, or have received a counter offer which no sane man could consider. After the war some of these successful dealers will be on the lookout for new lines.

Few, if any, of the motor car factories around Paris now remain closed. The failure of the Germans to make any impression on the allied lines, and the knowledge that the allied forces are steadily increasing, while the enemy is lowering his strength, has brought about a feeling of security and a revival of business as great as is possible with the manhood of the nation under arms. The Sizaire-Berwick factory has opened for purely touring car work; Darracq is increasing its staff by about forty men a week; Saurer is working day and night shifts; the Hotchkiss gun-making factory is to be returned to its original headquarters and the motor car department will reopen.

When the Germans threatened Paris the Hotchkiss factory was removed to Lyons. Such a removal would have been impossible, even at normal times, without the help of the government, and altogether impossible with a nation at war. Seven special trains were placed at the disposal of the factory, and the whole of the valuable machinery necessary for making guns was removed 300 miles and installed in a motor car factory at Lyons with such rapidity that a week later guns were being produced in bigger quantities than before. The demands on the gun section and the removal of half the factory to Lyons made it impossible to produce cars, but with the return of the works to Paris car construction will be resumed.

MECHANIC LALY A PRISONER

Paris, Jan. 1.—Robert Laly, mechanician to Rene Thomas on the winning Delage in the last Indianapolis race, is now reported a prisoner of war in Germany. On returning to Europe Laly resumed duties with the Delage racing staff. He was a pit attendant in the race at Lyons when Bablot backed his car over his mechanician's foot. Immediately Laly jumped into the injured man's seat and rode in the car until it was forced out of the race. On the declaration of war the racing mechanician joined his regiment and was sent to the front, where he took part in some of the severe fighting in Alsace. He was reported missing for some time and was considered dead. An official report now states that he was picked up wounded and carried a prisoner of war into Germany. The only other member of the European teams having visited Indianapolis and made a prisoner of war is Lieutenant Crossman, mechanician to Guyot in 1913.

Cole Joins Ranks of Builders of Eight-Cylinder Cars

New Model to Be at Chicago Show—Lists at $1,785

SAVING its surprise for the Chicago show, the Cole Motor Car Co., Indianapolis, Ind., announces an eight-cylinder model of 39.22 S. A. E. horsepower which will list at $1,785. It appears as a seven-passenger touring car and a three-passenger roadster. The first one of the Cole eights will be displayed at the Chicago show; 100 more will be ready in March and it is expected 1,000 will have been delivered by June 1.

AMERICAN MAKERS AND USERS OF EIGHT-CYLINDER MOTORS
In the order of their announcement

Make	Price	Bore and Stroke	Displacement	Cylinders	Rods
Cadillac	$1,975	3.125x5.125	314.6	Opposite	Yoked
King	1,350	2.750x5.000	237.5	Opposite	Yoked
Briggs-Detroiter	1,295	2.750x4.500	213.9	Opposite	Yoked
Remington	1,495	3.125x4.500	276.1	Opposite	Yoked
Regal	1,250	2.875x4.500	233.7	Opposite	Yoked
Ross	1,350	3.000x4.500	254.4	Opposite	Yoked
Cole	1,785	3.500x4.500	346.4	Opposite	Yoked
Abbott	1,685	3.125x4.500	276.1	Opposite	Yoked
*Perkins	.....	2.750x4.500	213.9	Opposite	Yoked
*Perkins	.....	3.125x4.500	276.1	Opposite	Yoked
*Herschell-Spillman	.....	3.000x5.000	282.0	Staggered	Side-by-side
*Buda	.....	3.000x5.125	289.7	Staggered	Side-by-side

*Engines built by motor makers.

Cylinder Heads Are Removable

The motor differs from most of the eights recently brought out in that the cylinder heads are detachable and the cylinders, though arranged in two blocks of four cylinders each at 90 degrees to each other, are in unit with the crankcase. Each block has integral with it a longitudinally-split half of the crankcase. The division is made at the crankshaft center, and the bearings are carried in one of the halves.

Another difference from the construction now employed by the majority of the eights which have come out with surprising rapidity during the past few weeks is that the valves are operated direct from the camshaft with no intervening rockers or shafts. The hardened and ground tappets are fitted with steel contact rollers, also hardened and ground. These bear directly against the cams.

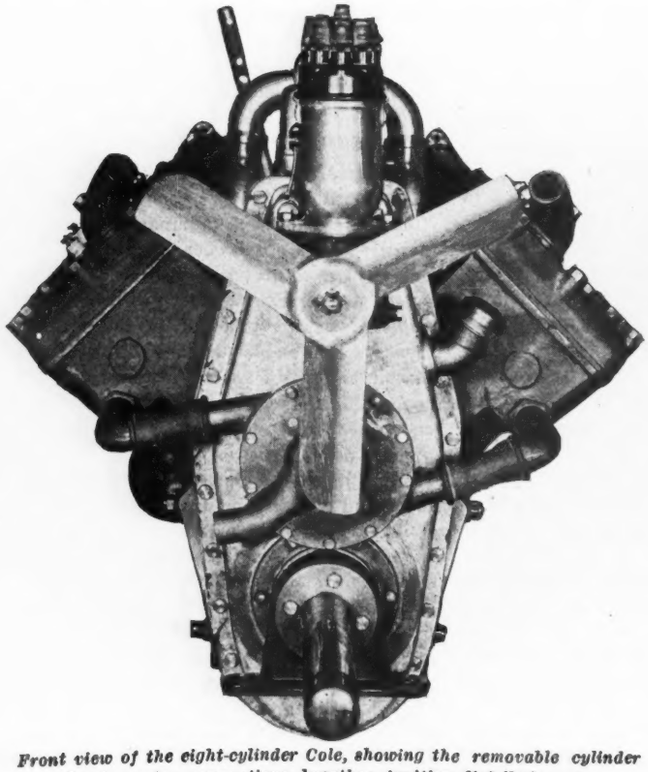
The camshaft and crankshaft and the method of connecting the rods to the latter through yoke ends and smaller ends fitted within the yoke arms are features of the design which do not differ from general practice. The camshaft is the same in form as that used in a four-cylinder engine and so is the crankshaft, only each bearing or each cam as the case may be takes care of its regular function for two opposite cylinders instead of one directly overhead.

Delco System is Used

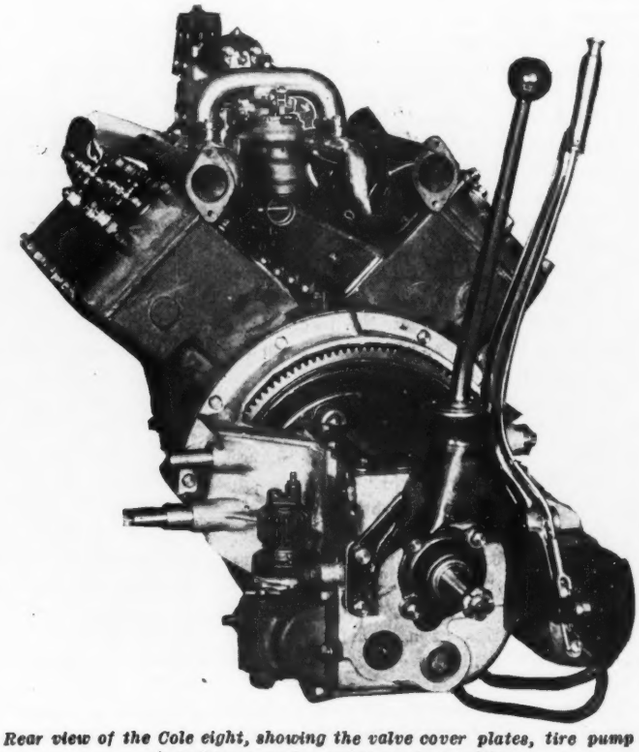
The cylinders have a bore of 3½ inches, and the stroke is 4½. Other specifications of the new Cole include Delco two-unit lighting and cranking, cone clutch, left drive, center control, three-speed gearset, shaft drive to a floating rear axle with drive through the springs, three-quarter elliptic rear springs, 126-inch wheelbase and 35 by 4½ tires all around.

Getting deeper into the design of the engine, which was constructed at the Northway factory, Detroit, for the Cole company, the power plant is of the three-point suspended unit type. That is, the clutch and gearset are inclosed within housings bolting to the crankcase. The cylinders are L heads, so that the full set of valves are in the V between the two blocks in the usual way. They are completely inclosed. The carbureter and generator are placed in this V also, but they are so placed as to give little interference with the reaching of the tappets or springs for adjustment.

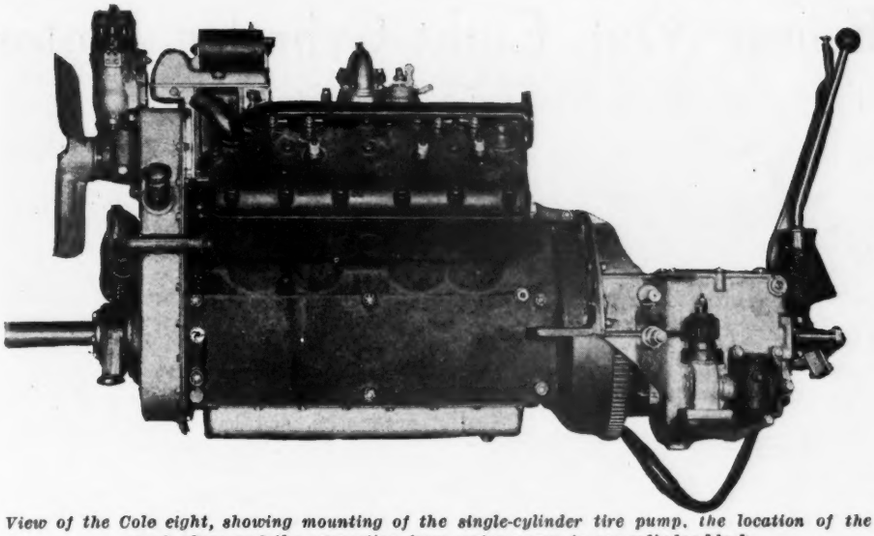
The crankshaft is carried on three main bearings which are babbit-lined bronze, and which have diameters of 2 inches front, 2 1/16 inches center and 2⅛ inches rear. The connecting rods are drop-forged in I-beam form with the shaft bearings



Front view of the eight-cylinder Cole, showing the removable cylinder heads, water connections, breather, ignition distributer, etc.



Rear view of the Cole eight, showing the valve cover plates, tire pump installation and cranking motor position



View of the Cole eight, showing mounting of the single-cylinder tire pump, the location of the spark plugs and the connection from water pump to one-cylinder block

2⅛ inches in diameter. One rod has a yoke end, and to it the babbit bearing is pinned, causing this bearing to oscillate with it on the rod as a bearing. The small-end rod which fits within the ends of the yoke is free to move on the outer surface of the babbit bearing, and thus its bearing is on this latter.

Valves Are of Tungsten Steel

The camshaft is of the usual drop-forged construction with the cams integral. It is carried on three bearings, the diameters of the front and rear being 1¼ inch and of the center, 1⅞ inch. The drive for the camshaft is by spiral gear from the crankshaft, it being vertically below the camshaft The valves are all of tungsten steel, 1½ inch in diameter. Their lift is 11-32 inch. The intake opens 15 degrees past upper dead center, and closes 38 degrees after lower dead center. The exhaust opens 45 degrees before lower center and closes 10 degrees after upper center. This timing is somewhat at variance with that ordinarily employed with the newer eights. The firing order is 1-8, 3-6, 4-5, 2-7, considering the first cylinder on the left as No. 1, the second on the left as No. 2, the first on the right as No. 5 and so on.

The method of cooling is by a single centrifugal pump which operates in connection with a cellular radiator and 16-inch fan. The lubrication system is of the pressure-feed type with a gear oil-pump driven by spiral gear from the crankshaft as the pressure source. The oil is pumped from the reservoir at the bottom of the motor up through ducts to the main crankshaft and connecting rod bearings, the throws being drilled to admit of this. It overflows from here to a pipe that leads to a pressure indicator and a pressure regulator and thence to a duct from which the camshaft bearings and cams are lubricated. The crank throw overflow lubricates the cylinder walls. The system operates with a pressure of 30 pounds per square inch.

Intake and exhaust manifolds are separate from the cylinder castings and bolt thereto. The carbureter is a specially-designed Stromberg, known as model H-2, and of 1¼ inch size. The carbureter is not hot-waterjacketed, but instead there is a hot air intake pipe. The fuel is drawn from a 16-gallon gasoline tank at the rear of the chassis by the Stewart vacuum feed apparatus.

The new Cole is fitted with the latest form of Delco electric apparatus for lighting, cranking and ignition. Instead of having a combination motor-generator and ignition distributer, there are three separate units. The generator, which is driven from the camshaft by an inclosed silent chain, is placed in the V between the cylinder castings. Its reduction as compared with the crankshaft speed is 2 to 1, that is, it runs twice as fast.

The cranking motor is mounted on the side of the gearcase and drives through gearing with the flywheel teeth with a ratio of 10.5 to 1. The system operates at 6 volts, and with it is used an Exide 80 ampere-hour storage battery. The ignition is a Delco apparatus of distributer form with dry cells and the storage battery as the sources of current. The spark control is entirely automatic.

A feature of the motor which makes for lightness and strength is the use of pressed steel parts wherever possible. For instance, the oil base which bolts to the bottom of the two crankcase halves is a pressed steel part. The same is true of the covers which go over the valve tappets and springs, of the cover for the gearcase and of the front housing for the motor gears.

The cone clutch used is in the flywheel and is leather-faced, acting against the cast iron of the first-mentioned part. Selective speeds are provided in the gearset which is a compact design with gears of stub-tooth construction.

The final drive is through an open propeller shaft which is fitted with two universals. The three-quarter elliptic rear springs take the drive. The rear axle is floating and equipped with Timken bearings throughout. The ratio is 3½ to 1.

Natural wood wheels are fitted as standard and lend a distinctive touch. They carry Firestone QD demountable rims. In the list of equipment is included Stewart speedometer, one-man top, curtains, tools, trouble lamp, power tire pump, extra rim, windshield, jack, etc.

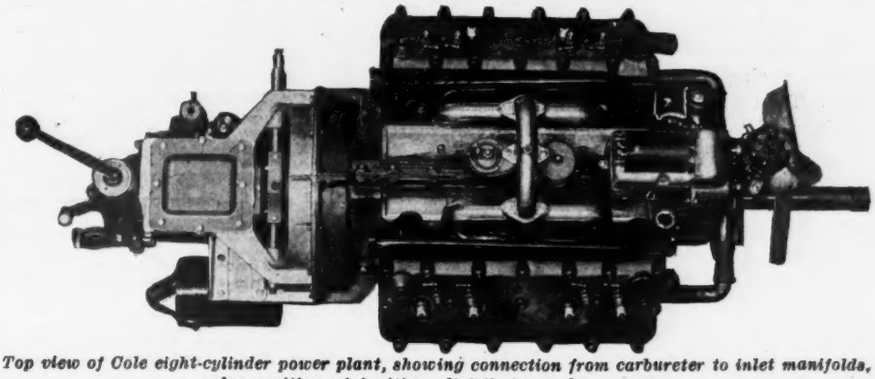
SHAW TO BUILD TAXIS FOR MARKET

Chicago, Jan. 15—Owing to the increasing demand for a vehicle specially designed for taxicab service, the Walden W. Shaw Livery Co., Chicago, has decided to build cabs for the trade. These will be exact duplicates of the ones which it has been building for its own service. Except for a few minor details, there are no changes over the last year's model. Comparitively large orders have been received already from various cities. The concern has facilities for turning out 500 cabs this year.

A slight change has been made in the motor, in that the timing gears are hardened and an extra long bushing being installed for the magneto shaft. The conventional type of brake equalizer is eliminated.

DEATH OF F. W. SPACKE

Indianapolis, Ind., Jan. 19—Fred W. Spacke, president and active head of the F. W. Spacke Machine Co., parts and motor manufacturer, died today after a lengthy illness. Mr. Spacke formed the Monarch Governor and Machine Co. and the Speed-Changing Pulley Co., both of Indianapolis. Ten years ago, the F. W. Spacke Machine Co., of which he was the head when he died, was organized.



Top view of Cole eight-cylinder power plant, showing connection from carbureter to inlet manifolds, also position of ignition, distributer and generator

Buda Company Brings Out Eight-Cylinder Motor

Engine Is V-Type With 3-Inch Bore and 5⅛-Inch Stroke

AN eight-cylinder, V-type, 3 by 5⅛-inch motor is the latest addition to the line of the Buda Co., Harvey, Ill. It is the second eight-cylinder type announced which uses connecting rods mounted side-by-side on the crank pins and two blocks of four cylinders each set one ahead of the other—staggered fashion. The cylinders are set at 90 degrees and in the bottom of the V is the single camshaft with eight integral cams, one operating two opposite valve push rods. All the valves are on the inside, as is the usual construction in eights using L-head cylinders. The Buda eight is called the model DEU, and it employs thermo-syphon cooling.

The placing of the cylinder blocks as mentioned increases the overall length but slightly over the type which uses cylinders set directly opposite.

The new Buda is designed to accommodate a unit clutch and gearset or may be had without the necessary fittings for this construction, but in either case the support is by three points. In the matter of weight the Buda eight is less than a six of the same size. The company gives 550 pounds as the weight with the regular equipment. The overall length is slightly over 33 inches and the width 26¾ inches measured from the outside of one cylinder block to that of the other.

Thermo-Syphon Cooling Used

The L-head cylinders have the base flanges extended to carry the push rods which are oiled by spray from the crankcase and are inclosed with the rest of the valve mechanism by cover plates. The cooling of these cylinders is by thermo-syphon with the waterjackets so placed that the cylinder is cooled around its entire bore, around the combustion chamber and the valve seats. The inlet manifold also is jacketed.

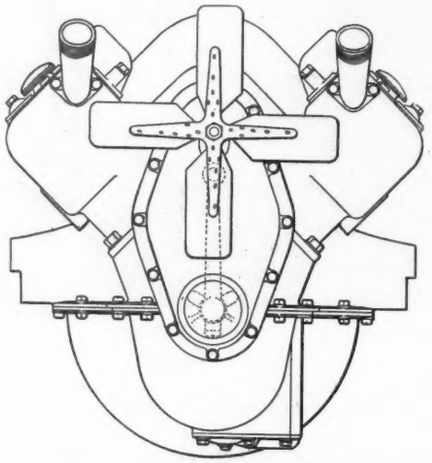
The valves are 1 1/16 inch diameter and have a clear opening of 1½ inch which is one-half the cylinder bore, the use of these large valves going a long way toward obtaining more power. The valves being inclosed by cover plates, the latter are provided with openings which act as crankcase breathers.

The crankcase is of aluminum alloy and houses a single camshaft with integral cams. The crankshaft is mounted on three bearings. Lower connecting rod bearings are adjusted easily by simply removing the crankcase oil pan. This also allows of the pistons being removed without disturbing any of the other parts. A feature of the piston construction is the use of a drilled skirt which causes excess oil to drain back and thus prevent smoking of the motor.

Lubrication is by pressure, oil being taken from a reservoir in the crankcase sump, by a gear pump, and forced through pipes to the crankshaft bearings whence it travels through ducts in the shaft to the rod lower bearings and the spray from these takes care of the cylinders, pistons, etc. The camshaft has direct leads from the main oil line. The motor fires as follows:

Right side	Left side
1	4
3	2
4	1
2	3

In the matter of accessories, provision is made for the mounting of either a standard magneto or some form of battery-system distributer. The carbureter is mounted between the blocks with all the accessories, and has a side outlet to a waterjacketed inlet manifold.



Front view of the newly-announced eight-cylinder Buda, showing the two interior outlets

Coming Motor Events

SHOWS AND CONVENTIONS

January 16-23—Show, Cleveland, O.
January 16-23—Show, Detroit, Mich.
January 18-23—Show, Rochester, N. Y.
January 19-23—Show, Baltimore, Md.
January 20-23—Show, Lancaster, Pa.
January 21-23—Show, Santa Ana, Cal.
January 23-30—Chicago show.
January 23-30—Montreal show.
January 23-30—Show, Portland, Ore.
January 25-30—Show, Buffalo, N. Y.
January 25-30—Show, Fall River, Mass.
January 26-30—Show, Tiffin, O.
January 30-February 6—Minneapolis show.
January 30-February 6—Show, Columbus.
February 1-6—Show, Louisville, Ky.
February 2-6—Show, Kalamazoo, Mich.
February 3-6—Show, St. Joseph, Mo.
February 4-6—Show, Marinette, Mich.
February 6-13—Show, Hartford, Conn.
February 8-13—Show, Toledo, O.
February 9-12—Show, Peoria, Ill.
February 8-15—Show, Kansas City, Mo.
February 9-12—Show, Eau Claire, Wis.
February 15-20—Show, Omaha, Neb.
February 15-20—Show, Grand Rapids, Mich.
February 15-20—Show, Tacoma, Wash.
February 15-20—Show, Fort Wayne, Ind.
February 23-27—Show, Ft. Dodge, Ia.
February 23-27—Show, Syracuse, N. Y.
February—Show, Rockford, Ill.
March—Show, Shelbyville, Ind.
March 6-13—Show, Boston, Mass.
March 8-13—Show, Des Moines, Ia.
March 13-20—Show, Harrisburg, Pa.

CONTESTS

* February 22—Vanderbilt cup race, San Francisco, Cal.
* February 27—Grand prize road race, San Francisco, Cal.
March 17—Road race, Venice, Cal.
* May 29—500-mile speedway race, Indianapolis, Ind.
June 9—200-mile race, Galesburg, Ill.
June 19—Chicago speedway race.
June 26—300-mile race, Sioux City, Ia.
August 20-21—Elgin road races.

* Sanctioned by A. A. A.

ABBOTT ANNOUNCES AN EIGHT

Detroit, Mich., Jan. 18—An Abbott eight-cylinder car which the Consolidated Car Co., successor to the Abbott Motor Car Co. is building, will be displayed for the first time at the Chicago show. Fully equipped, the price of the five-passenger touring car as well as of the roadster, will be $1,685.

The new eight will have a Perkins motor, the cylinders being cast in two blocks of four at an angle of 90 degrees from each other. The bore is 3⅛ inches, and the stroke 4½, giving an S. A. E. horsepower rating of 31.3.

Other features about the car are Zenith carbureter, Atwater Kent ignition system, Remy or Gray & Davis starting and lighting system—which one has not yet been finally decided—wood wheels with tires 34 by 4, Weston-Mott front axle and the regular Abbot floating rear axle. More complete details will be announced at the Chicago show by the company.

CHANGES IN SPECIFICATIONS

Since the publication of the specifications of American passenger cars for 1915 in Motor Age, issue of December 31, several concerns have made changes that differ from the published statistics.

There are three and not four Kisselkar models, the $1,850 model 40 four having been discontinued and replaced by the 36-four, which uses an electrical cranking, lighting and ignition system of the company's own design. The 42 six was listed as a touring car only, whereas there is a variety of body styles. The 48 six was listed as a four, a typographical error. The Kissel company is located at Hartford, Wis., not Milwaukee, as published in the directory of car manufacturers.

The Pratt 6-50 has a 132-inch wheelbase and 37 by 4½-inch tires. The horsepower is 33.75 S. A. E., not 22.50.

The Grant six lists at $750 but with electric lighting and starting at $795. The tire size is 32 by 3½.

The Hupmobile model K uses spiral bevel rear axle gears.

The horsepower of the Hudson 54-six is 40.8 instead of 27.20 as reported.

The Readers' Clearing House

COMMENTS ON HIGHWAY SAFETY

R. J. Miller Again Brings Up Subject of Transcontinental Touring

READING, Pa.—Editor Motor Age—It is extremely gratifying to hear of one voice in defense of my question, "Is the Lincoln highway safe and what is the method of police protection along this highway."

Weeks ago I wrote to men as far west and south as Yuma, Ariz., inclosing stamp and stationery, but the only reply I have seen was from Homer A. France, of Rawlins, Wyo., in Motor Age, issue January 14. It certainly is a relief to know that traveling conditions have improved, that the west is a civilized, growing, healthy country. That last sentence will mean a great deal to fellow motorists who have been debating on the route to San Francisco.

I, personally, have been asked at least a dozen times, "Have you the nerve to drive your car to the fair at San Francisco on account of the rather wild conditions of travel and accommodations. You may be obliged to sleep outside. Where are you going to keep the women?" I replied, "I am depending a great deal on the editor and subscribers of Motor Age to give me the true road and traveling conditions. But, up to this time, with the exception of our mutual friend, the editor of Motor Age, I have seemed to be on rather a lonely road."—Robert J. Miller.

FIRE EXTINGUISHER FORMULAE

Liquids Which Can Be Used to Combat Flame—Proportions to Use

Milford, O.—Editor Motor Age—I have heard of a solution for extinguishing fire, which is composed of a barrel of water with salt and some other chemical. Can Motor Age inform me as to the other ingredient? If not, give me a formula for such a solution.—W. F. Hudson, Jr.

There are many liquids fire extinguishers and one of the best is ordinary commercial ammonia. Another is composed of the following: Common salt, 1 ounce; sodium-nitrate, 1 ounce; sal ammoniac, 2 ounces; magnesium chloride, 4 ounces, and water, 20 ounces. The solids named are dissolved in the water. This solution probably is the one to which you refer. Another effective extinguisher is made of the following: Common salt, 20 parts; ammonium chloride, 9 parts, and water, 71 parts.

WILL BUILD A TWO-STORY GARAGE

Some Helpful Information Given—See an Architect for Plans

New York—Editor Motor Age—Kindly suggest what Motor Age considers an ideal equipment and arrangement for a two-story garage holding about fifty cars.

2—Which is the better material for such a building, concrete or brick?

3—Is it advisable to wash a car with water each day?—Otto X. Elbers.

1—The equipment should include a large-size lathe with all attachments—a grinder, a drill press, air compressor, forge and anvil, paint shop supplies, gasoline and oil storage systems, etc. For specific data on equipment you will have to determine just what work and how much you will do and then consult with other garagemen. Motor Age in its issues of October 1 and 15, last, in the Readers' Clearing House, showed two garage floor plans from which you will gain some information. An architect is the proper one to consult on this matter.

2—Both are in use and giving good results. The concrete appears to be the preferred form at present.

3—Cars should not be washed unless it is necessary. Sometimes only wiping of the body and dusting of the cushions is needed.

WANTS TO BUY A MERCEDES RACER

Interested in Model Which De Palma Drove at Corona and Elgin

San Diego, Cal.—Editor Motor Age—Was the four-cylinder Mercedes which De Palma drove in the Corona race last year one of the original Mercedes that ran in the French grand prix on July 4? If not, kindly give its motor size and other measurements.

2—Can the general public secure the same or similar model from the Mercedes company as was used in the grand prix? What would be the approximate cost of one laid down in New York? Kindly give me the address of the company's representative in New York.—Wm. Irwin.

The Mercedes which de Palma drove at Corona was the one which finished in third place in the French grand prix. De Palma also drove the same car at Elgin and won both races.

Motor Age is of the opinion the Mercedes company will build such a car to order. You wil get information concerning cost, etc., by communicating with the New York agent for the Mercedes company, the Paul LaCroix Automobile Co., 1770 Broadway.

GIVES HINT FOR FORD OWNERS

Says Too Much Oil in Timer Causes Hard Starting

Iron River, Mich.—Editor Motor Age—In most cases in cold weather Ford cars are very hard to start and generally it is thought to be caused by poor carburetion. I have found that the trouble often is caused by the timer having too much oil in it and the oil getting thick from the cold. By using a little kerosene in the timer just before starting it will thin the oil and give a good contact. I would like to hear of some other cold weather troubles with the Fords and the way to remedy them.—W. J. Walters.

Will Install High-Tension Magneto in Ford

Chicago—Editor Motor Age—I am considering the purchase of a Ford car, and contemplating the installation of a Bosch high-tension magneto in place of the present Ford magneto, and to convert their magneto into a lighting system. Kindly advise me the name or names of such reliable Chicago companies which will do the proper wiring for the proposed lighting system. Will Motor Age kindly give an idea of the cost of making this complete change?—F. A. Reyem.

Pellet's Magneto Exchange, 1606 Michigan Ave., Hansen's repair shop on Peck court or any good garage will do the work for you. The cost will depend entirely upon the amount of time consumed, which may be anywhere from 3 to 6 hours. The charge is 75 cents per hour.

MEANING OF THE WORD TORQUE

Refers to the Turning Effort and Is Expressed in Foot-Pounds

Brighton, Ia.—Editor Motor Age—What is meant by conventional gearset?

2—When a motor is being cranked or started by an electric motor what is meant by a torque of 35 foot-pounds?

3—Is it necessary to have a motor-driven pressure pump in connection with a Stewart vacuum tank on a car having gas tank in the rear?—L. W. Weible.

1—Conventional refers to the ordinary three-speed selective gearset. The selective type is in use on nearly all of the cars on the market.

2—Twisting or turning effort is expressed as torque, the unit of which is the foot-pound. A torque of 35 foot-pounds means that the force applied in pounds times the radius in feet through which the force is applied equals 35.

3—No. The Stewart vacuum gasoline feed eliminates all air pumps, air-pressure lines, etc.

Carbureter Is Leaking

Mission Hill, S. D.—I have a Holley carbureter on my 1913 Reo car which leaks when standing idle. What is the cause of this?

2—What kind of a float is used in the Holley carbureters?—Mark Nelsen.

1—The float may be stuck or gas-logged, or there may be dirt under the float valve, thus keeping it open and flooding the carbureter. Condensation in the mixing chamber and manifold also may be causing the trouble.

2—A cork float is used.

Rotary Valve Clearances

Kansas City, Mo.—Editor Motor Age—What is the rotary valve clearance in the motor used in the Speedwell six?

2—What is the compression pressure in the motor used in the 1914 Krit?

3—What force would break a cast iron rod 16 inches long and 2 inches in diameter, if the force were applied at the center of the rod?—Reader.

1—The clearance between the intake valve and its seat is .0005 inch and between the exhaust and its seat, .002 inch.

2—The compression pressure in Krit motors of 1914 model is 58 to 60 pounds per square inch.

3—About 1,800 pounds.

Questions Answered and Communications Received

Robert J. Miller.....Reading, Pa.
W. F. Hudson, Jr.....Milford, O.
Otto K. Elbers.....New York
Wm. Irwin.....San Diego, Cal.
W. J. Walters.....Iron River, Mich.
F. A. Reyem.....Chicago
L. W. Weible.....Brighton, Pa.
Mark Nelson.....Mission Hill, S. D.
Reader.....Kansas City, Mo.

No communications not signed by the reader's full name and address will be answered.

Among the Makers and Dealers

CUTS Capital in Two—The American Tire and Rubber Co., Akron, O., has filed papers reducing its capital from $500,000 to $250,000.

Will Make Kerosene Carbureter—A new carbureter, which will use kerosene instead of gasoline, will be made by Corbitt & Van der Bosch, 506 Oakland avenue, Grand Rapids, Mich.

Peninsular Sale Confirmed—Referee in Bankruptcy Lee E. Joslyn has confirmed the sale of the property and real estate of the bankrupt Peninsular Steel Castings Co., Detroit, Mich. Mathew Finn was the purchaser for $8,650, and, furthermore, assumed an incumbrance of $21,208 on the real estate. The appraiser's value was given as $42,480 for the real estate and property.

Receiver for Fire Apparatus Maker—On a petition filed by creditors, Russell T. McFall has been appointed receiver for the Howe Engine Co., manufacturer of motor fire apparatus, Indianapolis, and has qualified by giving bond in the sum of $50,000. The creditors who asked for a receiver were the Rutenber Motor Co., E. C. Atkins & Co. and the Hampton Printing Co.

Tire Factory to Reopen—Having received assurance that the rubber embargo had been lifted, H. L. Lewman, president of the Ten Broeck Tyre Co., Louisville, Ky., announced last week that the plant, which has been partly closed down since December 14, because of the limited supply of rubber on hand, would resume operations February 1 with a full force of employes. The concern has plenty of rubber in London, and now that the embargo has been raised there will be no difficulty in getting it to Louisville.

Aermore Horn Prices Reduced—The Fulton Co., of Milwaukee, Wis., has announced a reduction in prices on Aermore exhaust horns. The No. 1 size is reduced to $7.50, the No. 2 to $6.50 and the No. 3 to $5.50.

Willard to Build $25 000 Addition—The Willard Storage Battery Co., Cleveland, O., has secured a building permit for the construction of a factory building on East One Hundred and Thirty-first street, to cost about $25,000.

Case Adds Several Hundred Men—Because of the increase in orders in the motor car department, the J. I. Case Threshing Machine Co., Racine, Wis., has added several hundred men to its payroll, which now stands at 2,100, compared with 2,400 in normal times. By the end of January the Case company expects to be able to return all of its former employes to work and have a payroll of at least 2,500.

Goodrich Making Millimeter Solid Tires—The B. F. Goodrich Co., Akron, O., is helping out its Columbes, France, plant in the manufacture of the millimeter band solid tires. The American plant has imported a millimetre mold and will manufacture these solid tires to relieve the Colombes plant, which is being operated by the French government. It is stated that 350 of the employes, who were under 45 years of age, have gone to war, leaving the work of the plant on the hands of the older workmen. Both the French and English demand will be supplied and buyers of American commercial vehicles can have an equipment which is interchangeable with European standards.

Another Building for Overland—The Willys-Overland Co. has awarded the contract for the erection of a new three-story concrete, brick and steel building which will be 1,000 feet long and 200 feet wide.

To Direct Barthel & Daly Sales—W. C. DuComb, Jr., has been appointed sales manager and engineer of Barthel & Daly, importer of Schafer ball bearings. He has had charge of the engineering department of that company.

M. P. M. New Touring Car—The Mt. Pleasant Motor Co. has been organized to build the M. P. M. car. N. J. Brown is president of the company; H. A. Sanford, vice-president; W. A. Keen, secretary, and Mayor Deuel of Mt. Pleasant, Mich., treasurer. The designer of the car is L. J. Lampke. For the present a touring car only will be made, but later a runabout also will be placed on the market.

Hudson Sales Total $7,500,000—The Hudson Motor Car Co., Detroit, Mich., according to statements given out at the New York motor show, made a sales record of $7,500,000 in the 5 months between July 1 and December 1, 1914. This aggregate of sales compares with $3,000,000 in the same period of a year ago, and is an increase of 150 per cent. There are now 10,000 Hudsons of the light six model in use in forty-three different countries.

From the Four Winds

SELL Horses to Army; Buy Cars—Farmers in the provinces of Canada are exhibiting a tendency to replace their teams with motor cars and sell their horses to the British war department for remount purposes.

Seek to Change License Law—A bill, amending the state motor license law, has been introduced in the Indiana legislature. It provides that the annual licenses shall be collected by county treasurers, instead of by the secretary of state, and the money turned over to the townships directly for road improvements. The amendment also would provide a uniform license of $5 a year with a provision that an owner may hold the same license plates so long as he pays the annual fee. At present the license fees are graduated according to horsepower, except that electric vehicles are licensed uniformly at $5 a year.

Paralyzed Motorist Loses Licenses—One of the last acts of Albert Phillips, retiring secretary of state of Connecticut, was the revoking of the license of William Gordon Brown, of New Haven, because of physical disability. Brown, who is an instructor in a New Haven grammar school, was driving along the Berlin turnpike a few months ago with his family. His car was struck by a high speed electric train on the Middletown branch. As a result of this accident, one of many to happen at the point mentioned, the railroad company erected gates on orders of the public utilities commission. Brown's wife and two children were killed. It developed that the man had little use of his limbs, his car being especially fitted. It was the contention at the time of the accident that if he had been of normal condition, the accident could have been avoided.

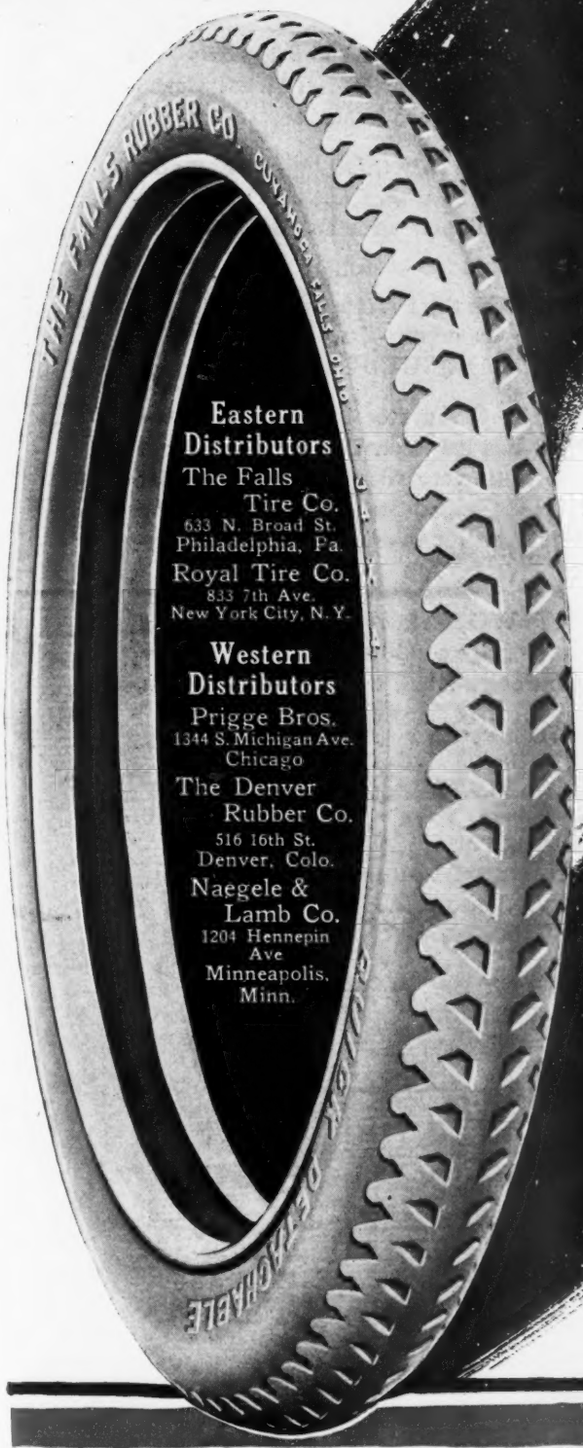
Arrange for Indianapolis Shows—The annual spring opening of Indianapolis dealers and manufacturers will be held the week of March 8-13, and will be under the auspices of the Indianapolis Automobile Trade Association. Each concern will exhibit in its own place of business, following a custom of several years. The association, however, will arrange a number of public events in which all dealers and manufacturers may participate. The association will hold its fall opening and show under canvas at the Indiana state fair in September.

Villa Buys Another Motor Car—General Francisco Villa of Mexico is a good patron of American motor car agencies. He seldom visits El Paso that he does not purchase one or more cars for his personal use or for military services of some of his subordinate officers. On the occasion of his recent visit to Juarez for the purpose of conferring with General Hugh L. Scott of the United States army with reference to the acute military situation on the border, General Villa decided it was becoming of him to buy a new motor car for the use of his distinguished conferee. In fulfillment of this idea he purchased a new seven-passenger Packard in which to convey General Scott and himself to the custom house, where the conference was held. General Villa took the car south with him when he departed from Juarez to resume his military campaign against the Constitutionalist forces.

Gasoline Foe of Arizona's Game—State Game Warden G. M. Willard, of Arizona, says in his annual report that the motor car is bringing about the extinction of Arizona's game because it gives city hunters an opportunity to reach in a few hours remote districts that were practically inaccessible before the day of gasoline travel. As a remedial measure he recommends that the legislature, now in session, absolutely prohibit the shooting of turkeys and big game for a period of several years.

Electric License Money to Cities—A bill will be introduced in the Illinois legislature soon to amend the motor car license law so that all money received from electric cars will be turned over to the city in which the cars operate and not to the state. As is well known, electric cars are largely for city use and it is rare that they are used for trips to the country districts. Due to this exclusive feature of the electrics, it is argued that the money derived from their licensing should be applied to the municipalities for use in maintaining pavements. It is said that there are between 4,000 and 5,000 electric passenger cars in Illinois, of which Chicago owns about 3,000. Bloomington has 125 and probably the other cities of the state range from 50 to 200. All these cars pay a fee of $5 per annum.

FALLS
NEVER-SLIP TIRE CASINGS



Eastern Distributors

The Falls Tire Co.
633 N. Broad St.
Philadelphia, Pa.

Royal Tire Co.
833 7th Ave.
New York City, N.Y.

Western Distributors

Prigge Bros.
1344 S. Michigan Ave.
Chicago

The Denver Rubber Co.
516 16th St.
Denver, Colo.

Naegele & Lamb Co.
1204 Hennepin Ave
Minneapolis, Minn.

STOP THE SKID BEFORE IT STARTS

□□□

They Grip the Road from Every Angle

□□□

They "Stand the Run"

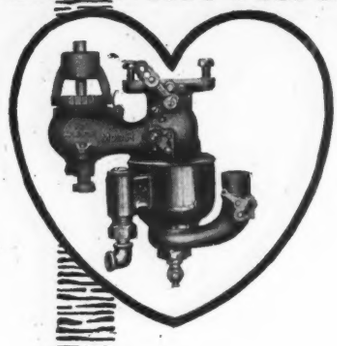
□□□

Absolute Safety Plus Extra Mileage

The FALLS RUBBER CO
CUYAHOGA FALLS OHIO

SCHEBLER

The Heart of the Automobile



America's Champion Road Racing Carburetor

SCHEBLER has won more official road races in the last ten years than any other American carburetor.

The Stutz—first among American road racing cars—winner in the last four years of 30 places out of 38 entries—has been equipped with the SCHEBLER Carburetor in every road race entered.

The National—second only to Stutz in road racing honors and winner of 26 places out of 37 entries—won all its races equipped with the SCHEBLER Carburetor.

The Buick—with the third largest number of road racing victories to its credit—30 places out of 49 entries—was invariably SCHEBLER equipped.

The SCHEBLER Carburetor is maintaining the lead today that it has held consistently throughout the last ten years. SCHEBLER has won every road race held thus far this year—Earl Cooper's SCHEBLER-Equipped Stutz taking first place in the San Diego Exposition 305-mile road race—and Dick Clarke winning the Tucson 102-mile event.

Nothing proves the EVERYDAY WORTH of a carburetor—the ability to stand up under most adverse service conditions—more certainly than road racing. SCHEBLER carburetors stand the gaff! Demand a SCHEBLER on your new car.

WHEELER & SCHEBLER
INDIANAPOLIS INDIANA

See Us at The Chicago Show,
Coliseum Gallery, Space 22

ATWATER KENT
IGNITION SYSTEM

Hot Sparks Make Easy Starting

MANY a starter, in winter, works hard and long to get its engine going. And many an owner thinks that that sluggish start is unavoidable.

But in most cases the trouble is not in the engine or starter at all; it is only in the weak magneto sparks that result from slow cranking speed. Give the engine a hot spark, independent of its speed, and it would start almost instantly!

Of course the gasoline must be vaporized. But the heat of compression will do that—often on the first or second turn. When an engine churns for 15 to 20 turns before starting, it is because the spark is too feeble to ignite the vapor present. When ignition finally occurs, it is because the heat due to friction has limbered the pistons and raised the speed. That heat represents a heavy expenditure of battery energy. And if the lights burn dim for a while thereafter, it is very easy to blame the battery or the dynamo, and to forget that one ten-thousandth part of that wasted energy, spent in producing one hot spark, would have saved all the rest.

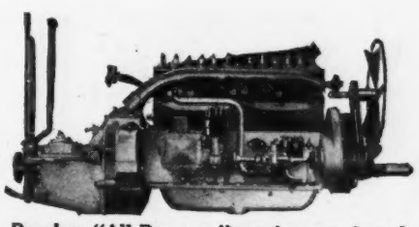
Atwater Kent Ignition, by furnishing a hot spark on the slowest turn, conserves the battery for its intended uses, and makes it easy to stop and start the engine as often as desired.

The hot starting spark is only **one** of the Atwater Kent System's advantages. Unlimited speed range, automatic retard for safe starting, automatic advance to suit the speed, quicker acceleration and easier control are others. Sixty builders of cars and engines have adopted this system for 1915.

Some Representative Atwater Kent-Equipped Cars:

Chalmers	**Hupmobile**	**Peerless**	**Saxon**
Pratt	**Imperial**	**Partin-Palmer**	**Scripps-Booth**
Enger	**King**	**Regal**	**Thomas**
			Velie

Atwater Kent Mfg. Works
4934 Stenton Avenue, Philadelphia, Pa.



Peerless **"All-Purpose" engine, equipped with Atwater Kent Unisparker.**

On Your New Car Demand

DANN INSERT

"The Insert of 10,000 Oil Pockets"

And be sure you get it. It is the one thing indispensable to the easy riding and lasting qualities of a car.

Manufacturers who use DANN Insert as standard equipment have gone down in their pockets to provide a better, more satisfactory car for the buyer. You can take it for granted that the mechanical structure of such a car is QUALITY throughout.

DANN Insert keeps the car springs **automatically** and **permanently** lubricated. It is the only device on the market that will keep them **always** up to their highest efficiency.

It is a fact that of the 2,000,000 cars in the United States today, only those whose springs are equipped with DANN Insert are as easy riding as the car manufacturer **meant** them to be.

When your car is equipped with DANN Insert spring lubrication troubles vanish. Squeaks, rusty, pitted, hard-riding springs—broken leaves—never bother **you.**

DANN Insert was the sensation of the New York Show. Don't fail to see DANN Insert—visit us—

At the Chicago Show
Coliseum Annex, Spaces 153-154

You will see one of the most noteworthy advances in automobile construction made in the last 10 years.

DANN Insert is a thin perforated strip of special metal, the perforations packed with heavy grease. This is installed between all the spring leaves, from tip to tip. The lubricant is fed **automatically** as required and cannot be squeezed out. DANN Insert is supplied in boxed sets for all makes and models of cars.

DEALERS:—Get in touch with us at once for complete information on DANN Insert. Now is the best time of year for you to take it on. Big profits can be made in the next few weeks, if you act now. Write today.

DANN OIL CUSHION SPRING INSERT COMPANY

2246 Indiana Avenue, Chicago, Ill.

Willard STORAGE BATTERY

New Willard branch at 2524-30 S. Wabash Ave., Chicago—brick and steel construction throughout — 14,000 sq. feet of floor space — room for 25 cars under cover at service end of plant

New Home of Willard Service in Chicago

The biggest and best equipped battery service station ever established for the benefit of car owners.

It sets a new standard in automobile service—but it's only in line with a long-established Willard policy. The new Chicago home is only an indication of nation-wide Willard service—found in every principal city in the United States, Canada and Mexico.

One of the first principles with Willard is that battery repairs should be made only by experts who have proper equipment and experience for doing the work right. In the Chicago branch, for instance, there are twenty-five factory-trained workmen. They can take care of all battery repairs, even to the complete taking down or building up of the battery itself.

Repair parts of all kinds are carried in the stock room ready for emergency use. The car owner can depend upon immediate replacement. Complete service is the rule.

85% of American makers of electrically equipped cars specify Willard Batteries. They recognize that long life and reliability are built into Willard Batteries. They also have confidence in Willard service to keep the battery tuned up to maximum efficiency when it is in the car.

Willard Storage Battery Company
Cleveland, Ohio

NEW YORK: 228-30 W. 58th St. DETROIT: 736-40 Woodward Ave.
CHICAGO: 2524-30 S. Wabash Ave. SAN FRANCISCO: 821 Monadnock Bldg.
INDIANAPOLIS: 318 North Illinois Street
SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO

Trainload Orders for Reo Automobiles

That Tells the Story.

ANY CAR WILL SELL in April and May.

ANY DEALER CAN SELL any car in the two busiest months in the year. There's always a shortage of the best and the most popular cars in those months, so the "lame-ducks" have a short inning.

BUT THE LINE YOU, as a dealer, want is the one that commands a steady demand all the year. One that does not fluctuate with the seasons. One that is not influenced by the latest freak announcement or price-cut.

REO IS THAT KIND of a car—the Reo line is that kind of a line.

DEMAND IS TREMENDOUS for these cars right now—and it is impossible for us to tell at this minute which model is going the stronger—the wonderful Reo The Fifth "The Incomparable Four," or the New Reo Six—"The Six of Sixty Superiorities."

JUST TO ILLUSTRATE TO YOU the condition that exists now—middle of January, War Year, here's a typical telegram. "Ship two carloads of Reos every day till further instructions—any model, and type of Reo just so long as they are Reos."

ANOTHER TELEGRAM: "Can't you consider exceptional conditions on Coast and ship us immediately trainload—100 Reos. Disregard previous orders and specifications—just ship any Reos you can. We need them now."

FROM FOUR CITIES came telegrams that were almost duplicates of that last one—all stating "exceptional conditions here—must have Reos."

CONDITIONS ARE NOT EXCEPTIONAL—that's the beauty of it. That's the great factor to consider in this Reo line. Reos enjoy not only a constant demand winter and summer but a universal demand—they are more popular in Portland, Oregon, than in Boston—until you hear what the Boston Reo dealer has to say.

DO WE WANT DEALERS—NO!—and YES. Here's the condition. You can understand it as well as we.

Carload Orders—and In January

OUR RECENT BIG ADVERTISEMENT has created a tremendous, instantaneous demand for Reo Cars—everywhere. Where we have good representation the Reo dealers are reaping the harvest. One dealer writes: "I consider the Reo agency worth fifty per cent more to me today than before that ad appeared.

AND, BY THE WAY, that same dealer—Philadelphia—sold, took deposits on—twelve Reo Sixes before he had a demonstrator to show. Reo Reputation for quality plus forceful advertising to drive the facts home. There's a combination that wins.

BUT THERE ARE A FEW PLACES where Reo Cars are just as much in demand but where we have no representation—or where we have second best. And second best is not good enough for Reo. The best dealer should represent the best car. And we firmly believe that car is Reo—each model in its class.

SO WE ARE OPEN to suggestions from dealers in such places. If you who read this happen to live in a town where there is no, or inadequate, representation; and if you are looking for the line you can tie to year in and year out and for which the demand has always been greater than the factory could supply—tho the plant covers nineteen acres—write us and we'll tell you whether or not there's a chance.

TELL US ALL ABOUT YOURSELF—your quarters, your standing in your community, with your banker—and especially with those to whom you have sold cars.

IF YOU ARE LOOKING FOR freaks—fly-by-night cars—"Stenciled" cars that you can sell this year and abandon next—don't write. We don't want that kind of dealers. In fact, we don't want dealers unless they are the best, the highest grade dealers. Only such can properly represent the Reo line. Reo is the kind of product that wins in the long run—we want only that kind of dealers.

AND IN THE HANDS OF SUCH dealers the Reo line is a money-maker—because it is a staple.

Reo Motor Car Company

Makers of Reo Automobiles and Reo Motor Trucks

LANSING, MICHIGAN

When Writing to Advertisers, Please Mention Motor Age.

REGAL

The
REGAL MOTOR CAR COMPANY

WILL EXHIBIT AT THE
CHICAGO AUTOMOBILE
SHOW, SPACE D 4
COLISEUM BUILDING

A NEW EIGHT

with stream-line, five passenger body, completely equipped, listing at $1250

A LARGE FOUR

with stream-line five passenger body, completely equipped, listing at $1085

A SMALL FOUR

with handsome stream-line body, completely equipped, listing at $650

Contracts will be made now for these cars in any open territory with dealers of recognized ability, energy and rating.

REGAL MOTOR CAR CO.
Detroit, Mich.

Everybody is Getting a *Stewart* Warning Signal at $5

"*Makes* Them Pay Attention"

The STEWART at $5 is the lowest-priced high-grade signal obtainable. And it can't be beat at any price. It is big, handsome and better. Gives a loud, clear, penetrating warning that clears the road.

If you have an inefficient bulb horn on your car—discard it ***now*** and get a STEWART Warning Signal.

Bulb horns are entirely out of style—unsightly—often ineffective and therefore dangerous in emergencies. Costly accidents are avoided by the use of a STEWART Warning Signal. It acts ***instantaneously,*** in response to the slightest pressure.

Try One for 30 Days

If you have an electric horn on your car get a STEWART Warning Signal and save your batteries for starting and lighting—a conservation most necessary in cold weather, when starting is harder, night lighting longer, and with less opportunity to re-charge on account of shorter runs, low speeds and frequent stops.

The slightest touch of hand or elbow on this plunger results in 192 vibrant sound strokes against the diaphragm. No fumbling for a bulb to squeeze. No chasing a button around the steering-wheel. No holding a button down.

No Need to Pay More!

This double supporting bracket holds the STEWART Warning Signal permanently rigid.

Built to outlast any car it is put on. Beautifully finished in black and nickel (or black and brass for Ford cars).

Dealers: Write for liberal proposition.

Stewart-Warner Speedometer Corporation

$10 Ends your Gasoline Feed Troubles when you install a

Stewart Vacuum Gasoline System

The STEWART Vacuum Gasoline System overcomes every single disadvantage connected with old style gravity and pressure feed systems. The first week you use it you will notice a marked difference in the running of your car.

You will find that your motor seems to have taken on a new lease of life—and is freer from carbon. You will experience no difficulty in getting gasoline to carburetor no matter what the conditions nor how steep the grade. You will probably discover you are getting better than 15 per cent more mileage per gallon of gasoline.

What the STEWART Vacuum Gasoline System Really Does—

Simply pumps gasoline from rear tank to a small tank under the hood, from which the gasoline merely falls in an even, positive flow to the carburetor.

No forcing gasoline through carburetor wastefully.

No pressure to upset correct working of carburetor.

No over-rich mixture to cause sluggish motors and carbonization.

Supplies gasoline to carburetor unfailingly, even going up the steepest grades.

No pumping air into gasoline tank before starting car.

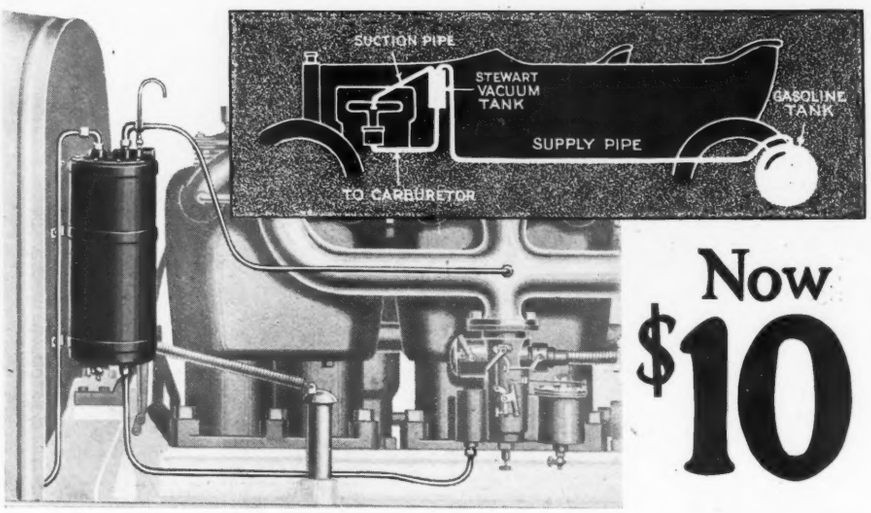
No air-tight connections necessary anywhere.

Provides warm gasoline and thereby makes starting easier.

Allows carburetor to be mounted close up against intake manifold, where it gets benefit of motor's heat.

Works absolutely automatically—once on your car you can forget it.

Standard Equipment on over 25% of all Cars



Installed in an hour, by anyone, on any car, old or new. Comes complete, ready to put right on your car. Try one for 30 days under money-back guarantee.

Dealers: Here's the biggest seller of the year. 1,500,000 cars without this system, and nearly every car in your town needs one. Write for dealer's proposition.

Now $10

Stewart-Warner Speedometer Corporation

$15 Frees you for Life from Hand-Pumping if you get a

Stewart Tire Pump

Just think of it—with a big, powerful gasoline motor right beside you, you still continue to use up your own strength needlessly by pumping your tires by hand! Why not let the motor use *its* strength, and so relieve you of all this unnecessary hard work?

Next time you are pumping a tire by hand stop and consider that *you* are doing work meant for a STEWART Tire Pump. Then, while your back is still aching, go and buy a STEWART Tire Pump from the nearest dealer—*before you forget it.*

Live manufacturers everywhere are recommending the use of the STEWART Tire Pump. They claim that 90% of all tire troubles are due to ***under-inflation.*** Half your tire costs can be saved by being able to ***keep*** them up to proper pressure.

Proper air pressure in your tires is impossible with a hand pump. Buy a STEWART Tire Pump, and get all the mileage ***in*** your casings ***out*** of them.

"Let the Stewart Tire Pump do your Hard Work!"

$15

Double air valves insuring positive operation
Cylinder beautifully machined Fins mean perfect cooling
Air intake screen
Piston oiled by oil-soaked wick
Crankshaft oil hole
OIL HOLE

Complete with 15 feet highest-grade rubber hose, accurate air gauge, bracket and gear, all complete and ready to put right on your car.

Try one Free for 30 days.

Dealers: Our national advertising campaign is stirring up a tremendous volume of business for you. Get your share. Prepare for the spring trade now. Write for dealers' proposition.

Stewart-Warner Speedometer Corporation

Standard Equipment on all Quality Cars

Stewart
Magnetic Type Speedometer

All manufacturers of quality cars have adopted the famous STEWART Speedometer as standard equipment. You may be sure that they use the STEWART Speedometer because it is *best*. The car buyer profits by the manufacturer's good judgment.

1,300,000 in use

Be sure to look for a STEWART Speedometer on the car you buy. The STEWART Speedometer reflects the quality of the car's general construction.

Wherever accurate speed readings are ***imperative,*** you will find the STEWART Speedometer in use.

Practically every corps of motorcycle policemen in this country uses the STEWART Speedometer.

"Always on the Job"

The STEWART Magnetic Type Speedometer is made in a wide variety of sizes and models at all prices, from $12 to $50.

Cases at law are decided every day by reference to the infallible STEWART.

You will never get caught speeding if you watch your STEWART Speedometer. Your 20 miles an hour and the motorcycle cop's 20 miles an hour will be ***identical.*** No danger of your speedometer being 2 or 3 miles off if you use a STEWART.

Only one moving part in the speed indicating mechanism of the STEWART Magnetic Type Speedometer. Less moving parts than in any other type. Built to outlast any car. The odometer registers up to 100,000 miles and repeats; trip record 100 miles and repeats, and can be instantly reset to any tenth of a mile or back to zero—an exclusive STEWART feature.

Dealers: The universal popularity of the STEWART Speedometer makes it a record-breaker for sales. Write for dealers' proposition.

Stewart-Warner Speedometer Corporation

FACTORIES: Chicago and Beloit, U. S. A. **EXECUTIVE OFFICES: 1931 Diversey Blvd., Chicago**

BRANCH HOUSES

Atlanta, Boston, Buffalo, Chicago, Cleveland, Detroit, Indianapolis, Kansas City, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, London and Paris

Service Stations in All Cities and Large Towns

Starting ELECTRIC DISCO SYSTEM *Lighting*

ALL THE REQUIREMENTS ESSENTIAL FOR A

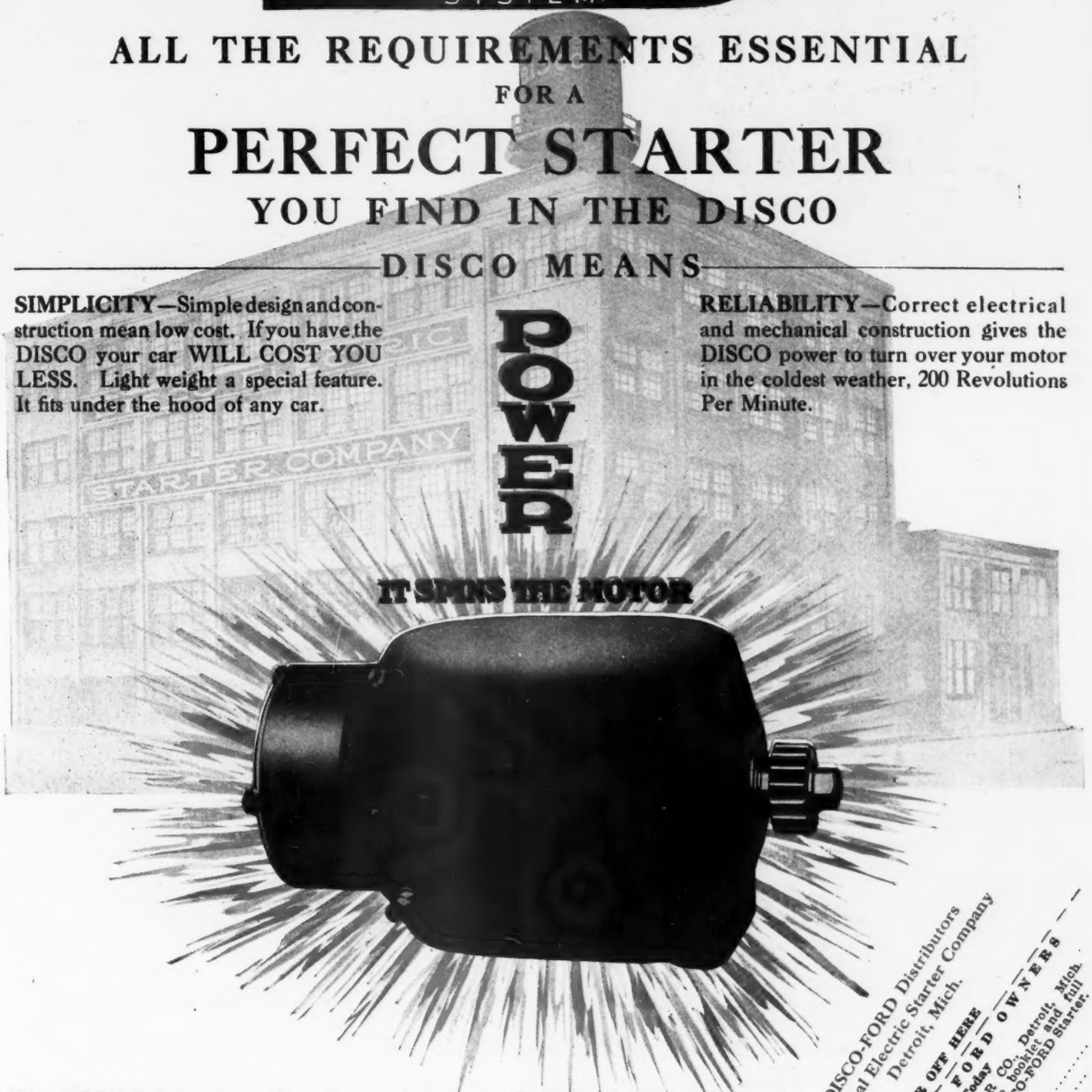
PERFECT STARTER

YOU FIND IN THE DISCO

DISCO MEANS

SIMPLICITY—Simple design and construction mean low cost. If you have the DISCO your car WILL COST YOU LESS. Light weight a special feature. It fits under the hood of any car.

RELIABILITY—Correct electrical and mechanical construction gives the DISCO power to turn over your motor in the coldest weather, 200 Revolutions Per Minute.



The DISCO company, pioneers in the starter field, have built thousands of starting and lighting outfits. The system is built under the supervision of experts, who, since the inception of the idea, have devoted their entire efforts towards electrical starting and lighting efficiency.

THE DISCO-FORD STARTER OUR SPECIALTY

DISCO ELECTRIC STARTER CO., Detroit, Mich.

DISCO-FORD Distributors
National Electric Starter Company
Detroit, Mich.

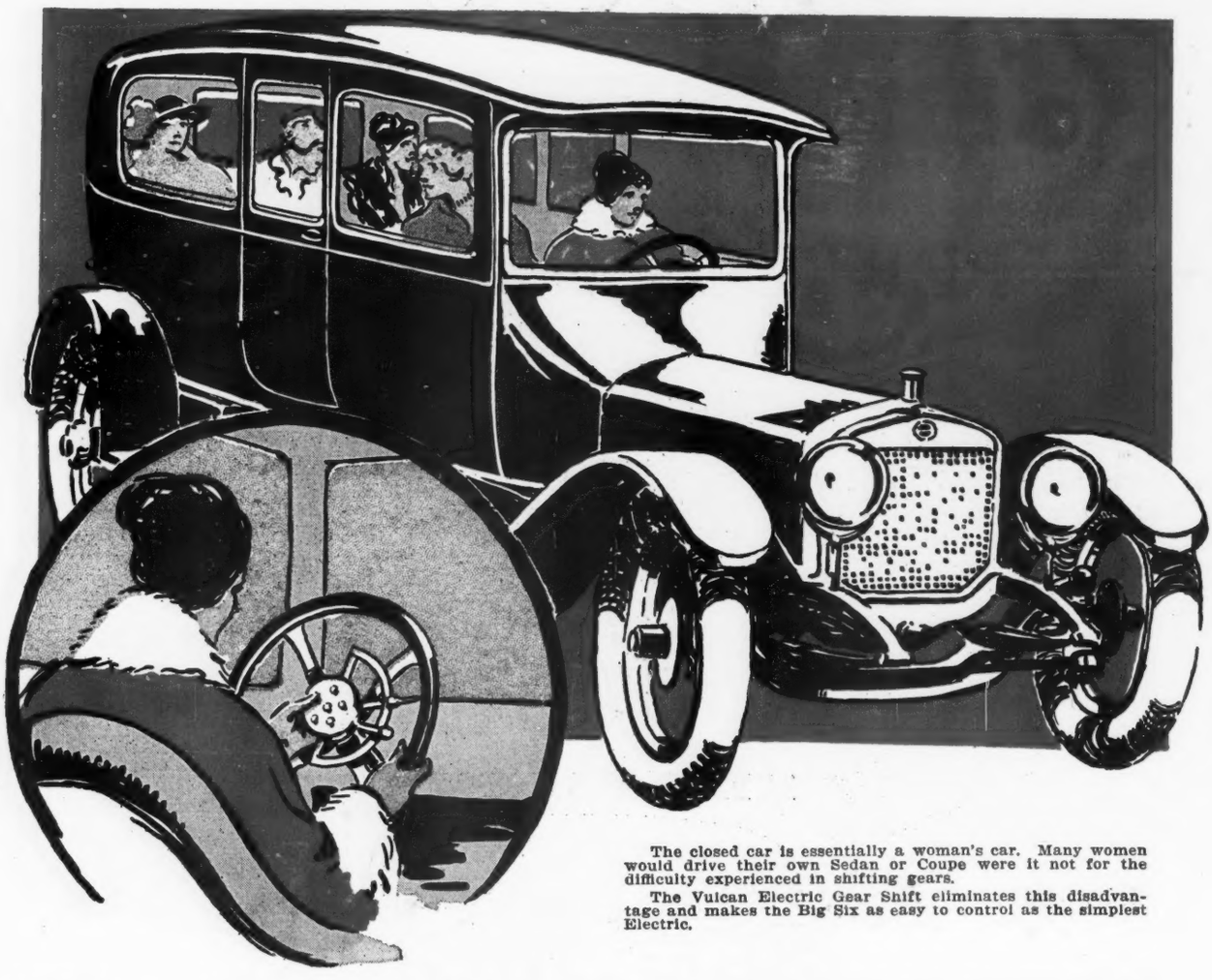
TEAR OFF HERE

ATTENTION FORD OWNERS

DISCO ELECTRIC STARTER CO., Detroit, Mich.
Gentlemen: Please send free booklet and full particulars about your DISCO-FORD Starter.

Name.....
Address.....
City.....
State.....

The Vulcan Electric



The closed car is essentially a woman's car. Many women would drive their own Sedan or Coupe were it not for the difficulty experienced in shifting gears.

The Vulcan Electric Gear Shift eliminates this disadvantage and makes the Big Six as easy to control as the simplest Electric.

WE are pleased to announce that the seal of approval has been placed on the Vulcan Electric Gear Shift by two of the most conservative manufacturers of motor cars in the United States,

The Winton Motor Car Co., of Cleveland, O.

and

The Thos. B. Jeffery Co., of Kenosha, Wis.

It can be had on the Winton Six or a Jeffery Six 48 whenever specified, at an additional charge of $150.

We have from time to time advanced broad claims relative to the merits of the Vulcan Electric Gear Shift. We do not ask you to accept our recommendations at their face value. On the contrary, we, with the utmost confidence,

Gear Shift Approved

refer you to the Engineering Departments of either of these companies, whose leadership in automobile engineering has been demonstrated by the successful pioneering of many of the most important developments in the automobile field.

The advantages of the Vulcan Electric Gear Shift are limited only by the extent to which a car so equipped is used. The adaptability of the gear shift is not confined solely to the higher priced cars, as its first cost is well within the reach of anyone who can afford to own a medium priced car, or of the manufacturer who builds such a product.

Space limitation prevents our detailing the many advantages, but if the only advantage were that of "pre-selection," the electric gear shift would be well worth its first cost. Take a big, powerful car through crowded traffic or up a steep, twisting hillside road and learn why.

Winton and Jeffery owners and other differentiating motorists will be interested in our forty-eight page book, "Gear Shifting by Electricity," which explains and describes in detail this latest refinement and simplification of control. Copy gladly furnished on request.

Ask your wife, sister or best girl why she does not drive and does not care to learn. Nine times out of ten the answer is **the trouble of gear shifting.**

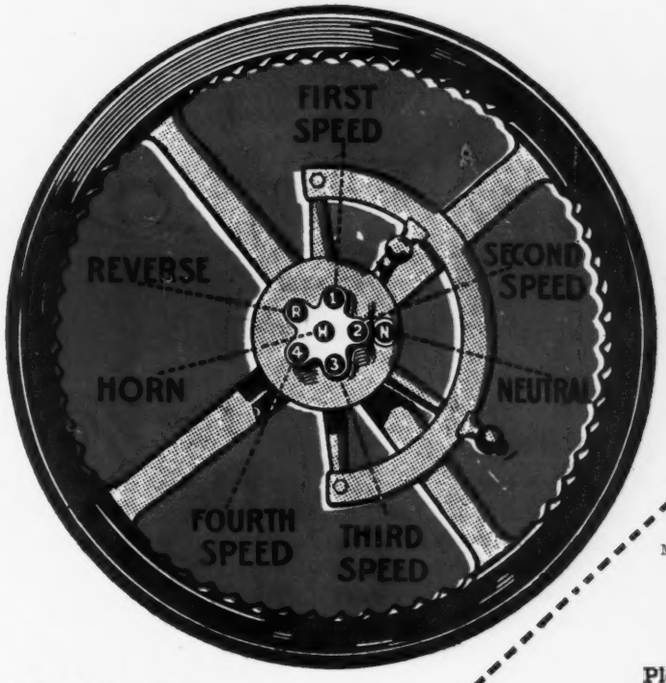
The Vulcan Electric Gear Shift supplies the final touch in the refinement of the modern gasoline motor car.

It is in effect a simplification, not a complication.

Its dependability has been proved.

Its cost is trifling.

Its usefulness is self-evident.



M. A.

Vulcan Electric Gear Shift Dept.

Cutler-Hammer Mfg. Co., *Milwaukee, Wis.*

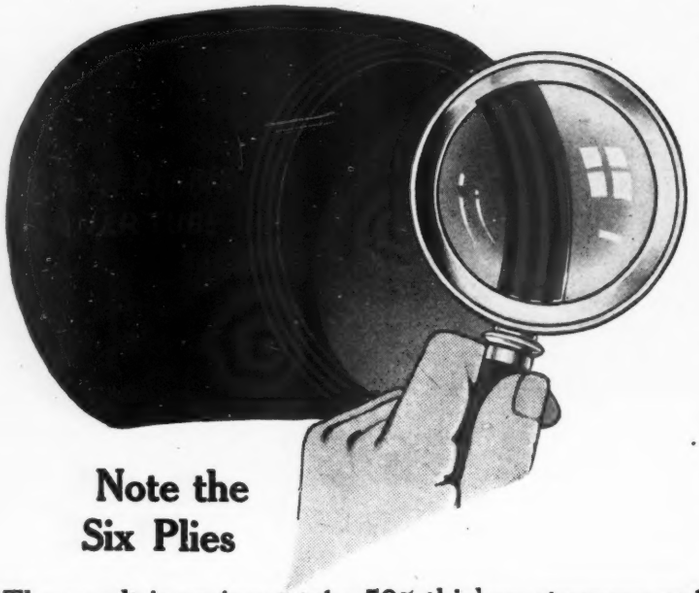
Twenty-two years experience in the manufacture of electric controlling apparatus.

Please send me your book, "Gear Shifting by Electricity."

Name .....

Address .....

Here is the "DOUBLE RUBBER" the INNER TUBE You've Been Waiting For



Note the Six Plies

Made of alternate plies of red and grey rubber.

The first inner tube to **combine in one tube** the **extra strength** and **toughness** of red rubber (pure Para—antimony cured) with the equally vital **high elasticity** and **imperviousness to air** of grey rubber (pure Para sulphur cured).

The result is an inner tube **50% thicker, stronger** and **longer lived**—and one which is absolutely free from air leakage because **each** of the many plies **forms an air-tight tube in itself.** The experienced motorist knows that the very best inner tube is the one he wants—that such a tube **saves bother** and **saves casings.** Write for a free sample section of the **"DOUBLE RUBBER"—and judge it for yourself**—or ask your dealer.

Red Reliner

Hand made, fine quality, low cost.

Genuine "Double Rubber" tubes have the red rubber outside with red and grey valve plate. We also manufacture Standard Grey and Red Tubes.

Rubber Tip Inside Patch

Red friction, white rubber feather edge ends preventing tube damage.

Jumbo Rubber Tip Patch

Made ⅓ longer than regular length so will hold even the largest break.

To Dealers:

Extra Quality, Attractive Appearance and **Exclusive Features** make **each** of these articles the kind of a thing you **like** to sell to your customers. **The Big Demand Created** among **Over 1,200,000 Owners** by our National Advertising in **Saturday Evening Post, Colliers,** etc.—and by a complete circularizing campaign including the sending of a piece of the Double Rubber tube to each owner—is entirely for the purpose of **increasing dealers' sales. Prices and Profits right.** You will find each article priced well in competition, even with much lower cost goods. Articles are priced to sell easy—no higher than most cheaper quality products and with your regular dealers' profit retained in full.

Here's a line that can pay the rent and on which many live dealers are doing a business running into thousands. Write promptly for prices and full information.

Double Fabric Tire

RED LINE QUALITY IN ANY TIRE REINFORCEMENT

Do You Know Your Tires "BREAK INSIDE"

Long Before The Tread is Worn Out

THAT'S WHY Extra Heavy Red INTERLOCK Inner Tires are Needed

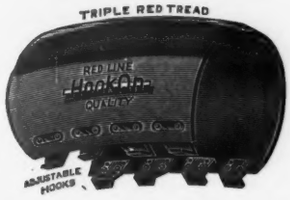
LIKE THIS—
Long before the tread is worn out.
Note this "You Can't Lose" Guarantee.
If any red Interlock fails to give full value, it will be replaced on the owners own statement.

They give old tires new strength, make them blow-out proof, practically puncture proof and much longer lived.

Adjustable Hook-On Boot

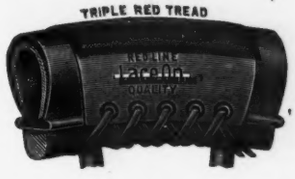
Easily adjustable to make an exact fit. Triple red rubber tread, white rubber sides.

Jumbo Hook-On



Made ⅓ longer overcoming the difficulty of some kinds proving too short.

Lace-On Outer Boot



The same extra quality as the hook-on. Also made in Jumbo length.

To Jobbers: The same broad **gauge advertising which brings sales to the dealer, brings an equal demand to you as his supply source. Compare prices closely**—anyway you like and you will find that we have used the advantages of **12 years experience, large volume sales** and our **well equipped rubber factory** (devoted exclusively to this line) for the one purpose of making this the **hottest, biggest selling line on the market.** In addition to salability and value, **we offer service**—that prompt delivery which is often worth as much as price. We manufacture to the jobbers own specification and under his own label where desired—but we strongly recommend the articles shown in this advertisement—as being the very **best** articles and **best** values. We furnish electros or 2 color inserts for your catalogue. Write us.

Company, Auburn, Ind.

MEANS GUARANTEED TO GIVE SATISFACTORY SERVICE

The New Rem

"As good as

REMINGTON TRADE MARK MOTOR CO. NEW YORK U.S.A.

What the name "Remington" means on a gun —What it signifies in the typewriter world— Now it guarantees in an Automobile. REMINGTON Cars are Honestly Conceived—Honestly Built—Honestly Sold—Honestly Guaranteed.

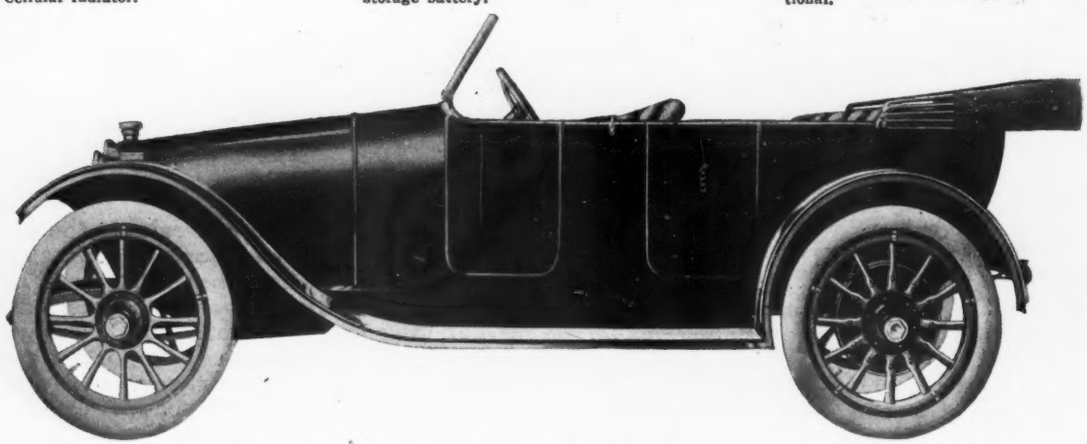
The Remington "Greyhound Eight"

The Biggest Hit of the Year
8-Cylinder, 45 h.p.—2, 4 or 6 Passenger Body **$1495**

It is the car destined to upset all theories and traditions of moderate priced car practice. It was a sensation at the New York Show. It will be a sensation at the Chicago Show. It will be a sensation wherever it is shown—on the road, in the crowded garage, in the dealer's showroom. You are wasting every minute you delay learning about the REMINGTON "GREYHOUND EIGHT" and our offer to progressive dealers.

Specifications—"Remington Greyhound Eight"

Front Axle—Drop-forged, I-beam. Tie rod in rear.
Rear Axle—Special design, full-floating type, nickel steel gears and shafts; housing casting arranged so that the outer shell and annular shells supporting the differential bearings form a truss, holding gears in perfect alignment.
Bearings—Timken, roller bearings in front wheels. Extremely large Schaefer imported annular bearings in rear wheels. F & S transmission bearings. Differential bearings, Timken long series.
Carbureter—Improved Zenith.
Clutch—Dry disc with 13 plates, alternate plates faced with Raybestos.
Control—Right or left hand.
Cooling—Centrifugal pump, driven by silent chain. Cellular radiator.
Frame—Pressed steel channel section; double drop under tonneau doors.
Lubrication—Constant level, splash and forced feed by ball plunger pump.
Motor—Eight cylinder, 3⅛ x 4½ in. Water-cooled. 45 hp. Front crankshaft bearings, 1⅝ x 2 3/32 in. Rear crankshaft bearing 1¾ x 4½ in. Connecting-rod bearings 1⅝ x 2⅝ in. Camshaft three bearing with integral cams. Connecting rods scissor type, high-carbon, heat-treated forging. Atwater-Kent ignition.
Springs—Underslung, semi-elliptic front; ¾ elliptic rear.
Starting and Lighting—Gray & Davis. All lamps lighted direct from generator. When motor is not running, current supplied by automatic storage battery.
Steering Gear—Worm and gear type, irreversible, 18-in. ebonized steering wheel.
Torque Truss and Radius Rods—Large spring suspended torque truss takes truss at rear axle. Driving through ball socket radius rods direct to side members of frame.
Springs are perfectly free of end thrust due to application of power, and perform only spring functions.
Transmission — Selective sliding gear — three speeds forward and one reverse.
Tread—56 inches.
Wheelbase—116 inches.
Wheels—Artillery type, natural wood finish with demountable rims. Tires, 35 x 4½ in.
Price—$1,495 f. o. b. Detroit, 2, 4 or 6 passenger body.
Wire Wheels—Set of five optional at $100 additional.



Every dealer that wants to handle a full line, quick-selling, self-advertising, should immediately find out from us about the "GREYHOUND EIGHT" and its smaller brother, the REMINGTON Greatest Value 4-Cylinder—$695.

ington Creations

the name"

You will not have to sell a REMINGTON car—it will sell itself. Now, Mr. Dealer, what do you want? Results—the greatest possible results for the minimum of effort? This can always be obtained by offering the greatest quality at the lowest price. This is your opportunity to join the REMINGTON forces and offer just that. You will be supported by the REMINGTON way of doing things. The REMINGTON fairness in business dealings is exemplary of the REMINGTON method of doing things.

The Remington Four

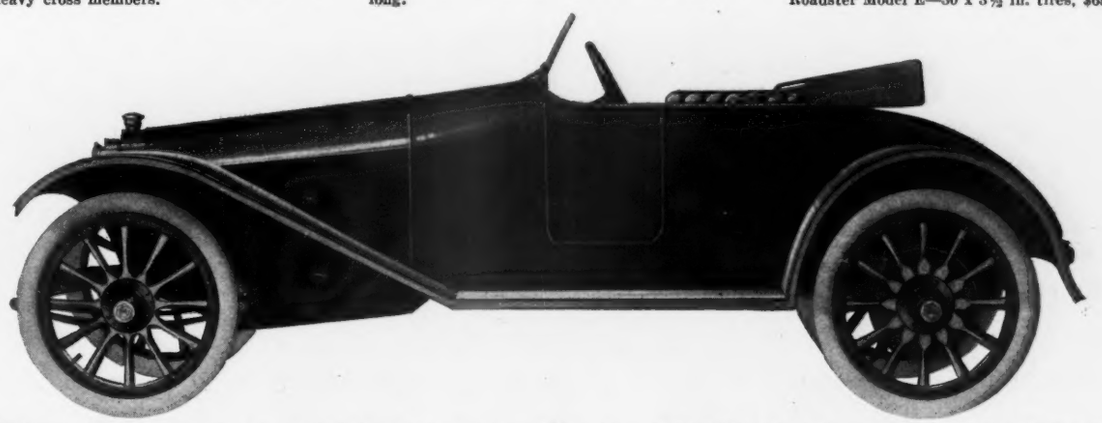
4-Cylinder 4-Passenger Touring
2-Passenger Roadster **$695**

Designed to please the most fastidious. Built to satisfy the astute critic.
Sold to meet the requirements of every man.

Every purchaser of a REMINGTON four receives his car with that confidence and pride of knowledge that comes to one who knows he has an elegant, dependable, satisfying car—a car that will fulfill his requirements to the utmost and give that fullness of service to be expected in a quality production.

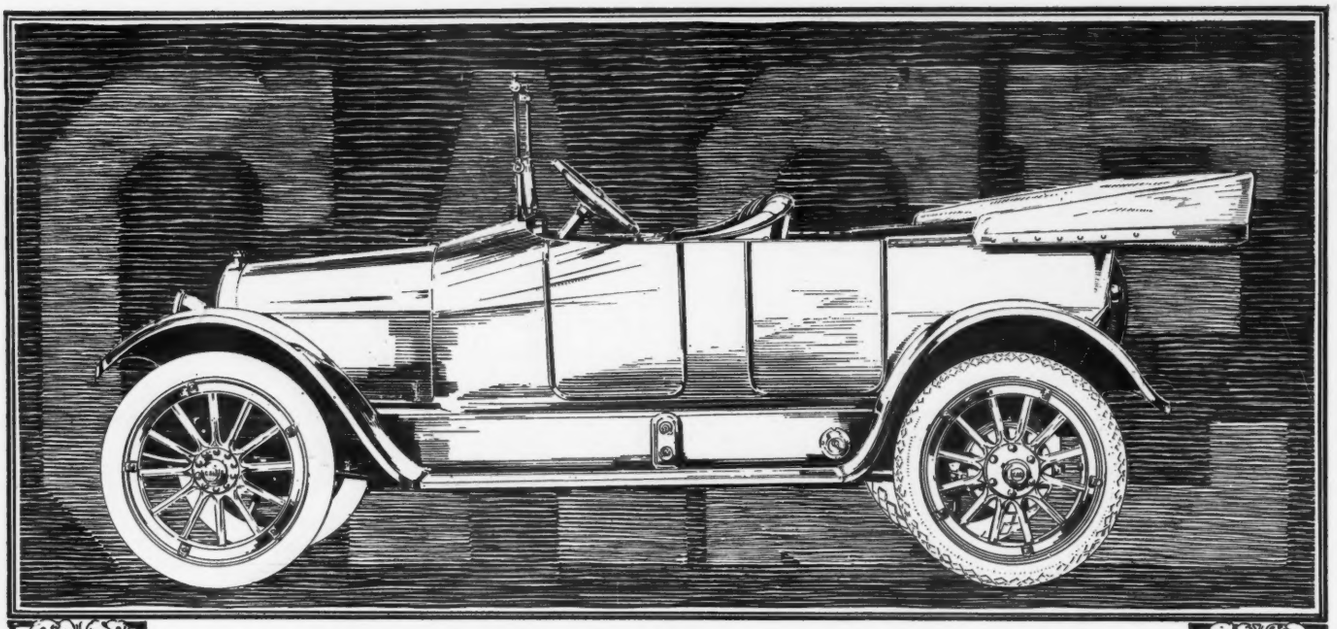
Remington Chassis Specifications

Axles—Front, I-beam drop forged; rear ¾-floating, bevel and pinion and differential; gears of special nickel steel specially heat treated.
Bearings—Front wheels, ball bearings—special construction; rear axle, Hyatt high duty extremely quiet roller bearings.
Body—Special Remington design—streamline.
Brakes—Service, foot pedal control—external contracting—on rear wheel drums; emergency, center control hand lever, internal expanding on rear wheel drums, adjustable for wear directly at the brake, retaining same leverage under all adjustments.
Carburetor—Float feed type.
Clutch—Cone clutch.
Colors—Brewster green.
Control—Spark and throttle on steering wheel.
Drive—Shaft drive with double universal joints.
Dash—Circassian Walnut, carrying all instruments.
Frame—Pressed steel channel section, 3-inch, with heavy cross members.
Gasoline Tank—Ten gallons' capacity, carried in the cowl.
Horn—Electric, concealed under the hood.
Ignition—Atwater-Kent.
Lamps—Adjustable focusing incandescent electric bulbs and dimming device for headlights.
Lubrication—Splash feed and pressure feed—very efficient.
Motor—Four-cylinder, cast enbloc, water cooled, thermo-syphon, 3-point suspension, 3½ in. bore, 4-in. stroke. Extremely large valves with low lift, insuring quietness of operation. All valves on right-hand side and enclosed. Belt-driven fan.
Paint and Varnish—Applied by hand of Remington quality.
Rims—Demountable—quick detachable.
Robe Rail—Adjustable strap.
Springs—Front, semi-elliptic, 1½ in. wide, 32 in. long; rear cantilever, 1½ in. wide, 37½ in. long.
Steering Wheel—Left drive, 17 inches in diameter.
Top—One-man top, Mohair.
Tool Kit—Standard equipment, with tire pump, jack, etc.
Transmission—Three speeds forward—one reverse. Center control. Operated by Remington automatic gear shift. All gears nickel steel mounted on Hyatt high duty, specially quiet roller bearings.
Universal Joints—Spicer.
Wheelbase—106 inches.
Wheels—Hickory spokes, natural finish demountable rims.
Windshield—Special design.
Fully equipped with top, windshield, speedometer, electric horn, electric lighting and starting outfit and automatic gear shift.
Weight—Touring car, 1500 pounds; roadster, 1350 pounds.
Price—Touring Car—30 x 3½ in. tires, $695.00. Roadster Model E—30 x 3½ in. tires, $695.00.



These Two Cars Are Already the Leaders for 1915 Both Completely Equipped

REMINGTON MOTOR COMPANY, 2 Columbus Circle, New York City
AT CHICAGO WE'LL BE AT 1 COLISEUM, BASEMENT



The NAME Behind the Car

Since 1842 the name of CASE has stood for excellence in motive power machinery. We have developed, through sound methods, a tremendous manufacturing industry. Our selling organization is world-wide. And it handles CASE cars in conjunction with our other products—a noteworthy fact for you to remember.

By this great advantage we save where others must spend. And so we do spend where others must save. Thus better materials and better workmanship at a lower price are obtained in this car.

Your faith in this product may be safely founded on our reputation. We have earned it through 70 odd years of manufacturing experience. And this experience is back of the smallest part.

Judge CASE cars by *value* not by purchase price. Their value is determined by their service. On this basis they are incomparable, as the man who reasons knows.

And remember that the CASE "25" at $1350, with 5% discount if cash, is *completely equipped.* Note its sound specifications and added equipment not found in any other car

CASE "25" $1350—5% *Discount if Cash*

This car will be shown at Exhibit D-6, The Chicago Automobile Show

BODY:
Distinctive Streamline, with concealed hardware.
Upholstering—Genuine leather, high-grade curled hair.
Cushion Springs—Strong, deep and comfortable.
Full-size door openings.
Actual five-passenger capacity. Foot and robe rails. Protective covering on back of front seat.
One-Man mohair top with quick-adjustable side curtains folded in top. Top cover enclosing bows.
Windshield, rain vision, ventilating.
15-gallon gasoline tank in cowl; gauge and filler spout on cowl; tank easily removed without disturbing body.

CHASSIS:
Motor-Built in our own shops: T-head, 3¾-inch x 4¾-inch.
Starting and Lighting—Westinghouse six-volt system.
Ignition—Westinghouse high tension, separate unit. Automatic spark control.
Carburetor—Stromberg; dash control.
Spark plugs located in centers of high compression cylinders.
Highest grade Wasson piston rings.
Crank shaft and connecting rod bearings, bronze backed, lined with very highest grade babbitt.
Crank shafts, connecting rods and cam shafts of Case special formula steels forged and heat treated in our own shops.
Valves—Solid 3½ per cent nickel steel.
Lubrication—Splash system, constant level maintained by positive driven plunger pump in connection with non-leaking circulation indicator on dash.
Radiator—New design core construction, of unusual efficiency and strength.
Clutch—Multiple disc, best high-friction non-burnable facings on steel.
Spicer Universal Joint.
Transmission—Gears and shafts of special alloy steel, Timken bearings throughout.
Axles—Front, I-Beam section, steering knuckles and arms all forged and heat treated in Case shops from chrome nickel steels, Timken bearings.
Rear—Advanced design, floating; pressed steel housing; large bearings and driving gears; distinctive Case hubs and caps. Brakes—Unusually large, 14-inch drum, 2-inch face.
Frame—Very strong construction, with large factor of safety. Clean running boards of pressed steel, linoleum covered, aluminum bound.
Spring Suspension—Long, easy riding, floating cantilever type, phosphor bronze bushings, all main plates special analysis alloy steel.
Pressed Steel Crown fenders.
Wheelbase—115½ inches.
Drive—Left-hand, center control.
Large 18-inch corrugated steering wheel; horn button in center.
Headlights, double bulb; tail light, number lighting, with Chicago switch; dash light; work light on 10-foot cord. All single wire system.
Tires—34-inch x 4-inch, non-skid on rear wheels; demountable rims.
Color—Dark Brewster green.
Jack, Tire Pump, Repair Kit and Usual Tools.

EXTRA EQUIPMENT:
Extra Casing and Tube on Rim, with Cover.
Weed Tire Chains.
Eight-day Clock.
Speedometer.
Electric Horn.

CASE "25"
$1350

CASE "35"
$1600

CASE "40"
$1800

5% Discount if Cash

CASE

The Car With the Famous Engine

May we send you our catalog describing CASE cars?

J. I. Case T. M. Company, Inc.
Founded 1842
507 Liberty Street
Racine, Wis.

(262)

CHAMPION PRIMING PLUGS

are guaranteed to start any motor, any time, on the first quarter turn.

Do you realize how much satisfaction it is to walk into the cold garage, shoot a little gasoline into CHAMPION PRIMING PLUGS, give the motor a turn and have it begin to hum?

We wish you that satisfaction.

Use Champion Priming Plugs and **start your motor** at any time on the **first quarter** turn.

A few drops of gasolene in the needle valves of your CHAMPION PRIMING PLUGS, a turn of the engine and away she starts.

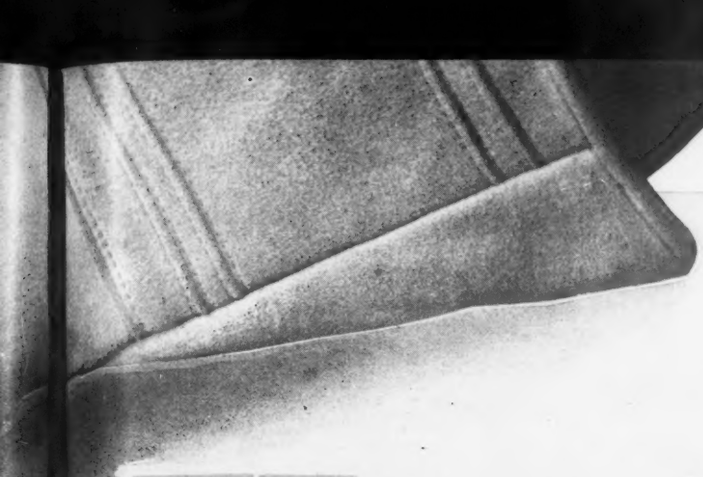
Have you had the uncomfortable experience of cranking, and cranking and cranking a cold motor? You do "some" thinking about the time you are wiping your brow after the hundredth turn. Have you used your self starter over and over again and still the motor would not take hold? And you know that electric current costs something, too. That is a good moment to decide to equip your car with a set of CHAMPION PRIMING PLUGS.

But there is a better time to make that decision, and that is **now,** before the last unhappy moment comes when there is a hurry-up call, or a rush trip to be made, and you find that the "durn" thing absolutely refuses to start.

A set of priming plugs is a small investment but a big satisfaction. It's a great cold weather insurance and the premium is exceptionally low. Just $1.25 for each Champion Priming Plug.

PRICE $1.25

Toledo Made



WINTER STARTING TROUBLES NEVER TROUBLE THE MAN WHO USES CHAMPION PRIMING PLUGS

Everybody realizes the advantage of a simple, inexpensive device which makes it possible to **always** start your car, even in the coldest weather.

With our new model Champion Priming Plug we are supplying a key lock, right in the needle valve, always in place ready for use. With the key lock it is the simplest thing in the world to open the needle valve, prime and then close the valve so tightly that there is absolutely no chance for loss of compression. You don't even have to remove your gloves.

When you buy a set of priming plugs you still want ignition. Insist upon the CHAMPION PRIMING PLUG, the only plug made with a needle valve attached for priming. Easiest to operate. Needle valve never opens from vibration.

Caution: Beware of all petcock type priming plugs with leaky petcocks.

CHAMPION PRIMING PLUGS are built with the same care and manufacturing methods which are used in the manufacture of all Champion Plugs. In fact, the Champion Priming Plug is simply a tried and proven Champion Spark Plug which has the additional feature of a truly efficient priming device.

Guarantee: Complete satisfaction to the user, or free repair, replacement or your money back.

for the Whole World's Trade

A Self Starter For $125

The man who handles automobile accessories in any town in the United States and isn't prepared to supply his customers with the famous CHAMPION PRIMING PLUG, needle valve type, is simply missing a real business opportunity.

If, at the end of the season, you have several CHAMPION PRIMING PLUGS in stock, you are always allowed to exchange them for other types of Champion Spark Plugs at full cost allowance. You run absolutely no risk at all in stocking Champion Priming Plugs as the manufacturers will take care of you in every way.

Every jobber in the country has Champion Priming Plugs in stock or can procure them for you on your order at once.

Your busy season on Champion Priming Plugs is here. Take advantage of it.

CHAMPION SPARK PLUG COMPANY
TOLEDO, OHIO

NOTICE: Our 1915 car index is just off the press. It tells you the size of the spark plugs used in every pleasure or commercial car. On your request we will gladly send it to you.

"LIBERTY BELL"

The Effective Automobile Warning Signal

Motorists will appreciate at once, the comfort and convenience of the dignified and effective LIBERTY BELL, the electric warning signal that, with clear, musical tone, warns without offending—and instantly clears the way. The LIBERTY BELL

Warns Both Ear and Eye

Pressure on the LIBERTY electric push button, with hand or foot, sounds a politely convincing bell, and simultaneously flashes a red warning light.

LIBERTY BELLS are unusurpassed for use in the crowded traffic of city streets, and on country roads. They comply with laws governing motor car alarms in all cities.

Satisfies a Long-Standing Need

The need of an effective and agreeable auto warning signal is as old as the automobile.

Everyone instantly recognizes the bell to be a well-meant warning. Few fail instinctively to obey its courteous demand.

Made in Three Styles

LIBERTY BELL is made of highest quality metals, throughout. Fitted with platinum contact points. Dirt, water and fool-proof.

No. 1—5 in. high and 5 in. diameter at base. Ready for installation—

Equipped with Eagle.....$10
With Red Light..... 12

No. 2—6 in. high and 6 in. diameter at base. Ready for installation—

Equipped with Eagle.....$12
With Red Light..... 14

Special No. 1—With plain top and smaller coil. Ready for installation.$7.50

Money back if you are not satisfied on examination. Payment C. O. D., or cash with order.

Notice—For your own protection, be sure and obtain the patented Liberty Bell. Any person, firm or corporation manufacturing or using an infringing device is liable under the law.

DEALERS—LIBERTY BELL is a signal you should sell to all discriminating motorists. Write today for dealers' discounts.

The Liberty Bell Company
346 D, The Arcade
Cleveland, Ohio

The Great Cold Weather Carburetor

The New Stromberg Carburetors are proving their superiority in every demand made on them. Regular stock models have made world's records in Gasoline Economy, Power, Flexibility and Acceleration—these records have been made on cars that have been in use or are ordinary stock cars under conditions that you would encounter with your car.

In addition, these are all official records. Cold weather has no terrors for the New Stromberg Carburetor. They are fitted with what is known as a strangle valve in the primary air inlet for starting in cold weather. Even though the carburetor and engine are at zero temperature the high vacuum produced in the carburetor by closing all air inlets, readily vaporizes the gasoline and insures easy and safe starting.

Read These Remarkable Records:

Jeffery Six

In an official test this car, which with five passengers weighed 4100 pounds, equipped with a New Stromberg Carburetor, made the remarkable record of 28.7 miles on one gallon of gasoline, or 58.8 ton miles.

Cole Touring Car

Four cylinder stock car carrying seven passengers which with the car weighing 4390 lbs. and being equipped with a New Stromberg Carburetor, traveled 24.135 miles on one gallon of gasoline. In thirty minutes speed tests this car averaged 55.63 miles per hour.

Overland 80

Carrying five passengers, total weight 3930 pounds, this car equipped with a New Stromberg Carburetor in an official A. A. A. test, with one gallon of gasoline, went 29 miles or 56.9 ton miles.

Haynes Light Six

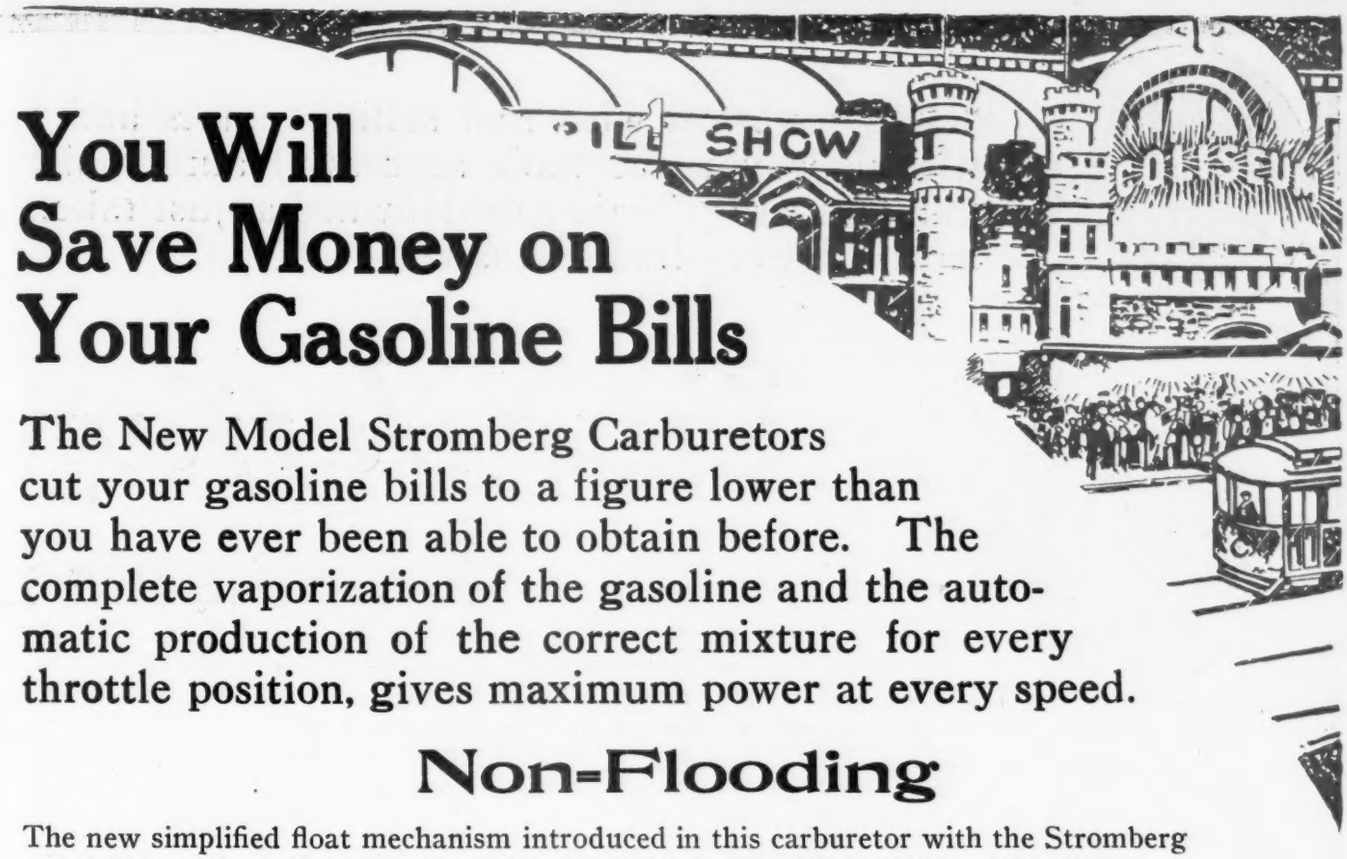
Equipped with a new model Stromberg demonstrated its power in the Pittsburg hill district. It climbed hills on high without overheating, with car and passengers weighing 4390 pounds, running from 2 M. P. H. in high gear it was speeded up to 42 M. P. H. in 200 feet.

Speed With Marmon Model 41

The wonderful speed test made on the Marmon Model 41 at Indianapolis was made possible by the fact that the car was Stromberg equipped.

During this test, the car, with top and windshield up, carrying five passengers, made the remarkable record of 62.89 miles in sixty minutes.

THE NEW STROMBERG



You Will Save Money on Your Gasoline Bills

The New Model Stromberg Carburetors cut your gasoline bills to a figure lower than you have ever been able to obtain before. The complete vaporization of the gasoline and the automatic production of the correct mixture for every throttle position, gives maximum power at every speed.

Non-Flooding

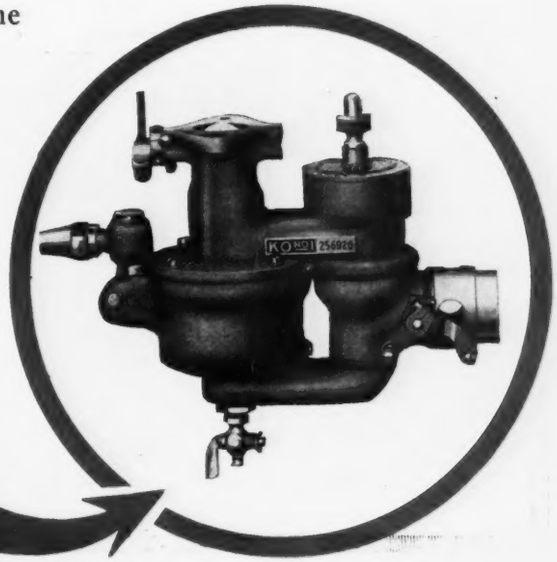
The new simplified float mechanism introduced in this carburetor with the Stromberg metal float and needle valve of special metal eliminates all possibility of flooding.

Our 30-Day Trial

Put one of these carburetors on your car for thirty days, then at the end of that time if you are not absolutely convinced that it is a better carburetor in every way than the one you now have on your motor we will gladly refund your money.

Meet Us At The Show

See these wonderful carburetors at the Chicago Auto Show, Coliseum, Jan. 23d to 30th, 1915. We will have a complete display of the New Stromberg Carburetors there. Come in and let us explain to you why they will get better results from your motor. If you do not come to the show, be sure and send for literature, give us the name and model of your car and we will tell you just which of the New Stromberg Carburetors is best adapted for it.



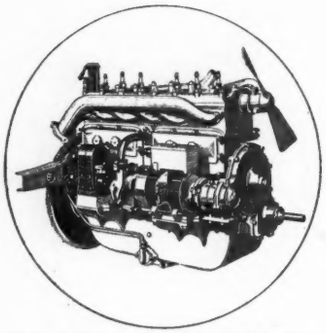
Stromberg Motor Devices Co.

64-66-68 East 25th Street Chicago, Illinois

DOES IT!

The Thomas B. Jeffery Company
Jeffery
Kenosha, Wis. U.S.A.

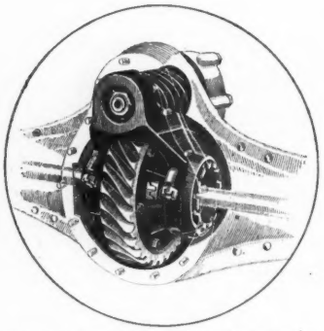
"Give me a car with real selling points and I will show you the most successful automobile in my territory," said a dealer who has just taken on the Jeffery line exclusively.



Jeffery Chesterfield Six Motor. Bijur starting and lighting. Bosch ignition. Cylinders 3" x 5" developing 42 horse power.

The Jeffery Dominates in

The high-speed, high-efficiency motor popularized by the Jeffery light four and developed to its highest point in the Jeffery Chesterfield Six is now the accepted standard for proper motor construction. Cylinders 3" by 5" develop the same power as slow running motors of twice the size, and with 50% greater economy, greater flexibility and smoother running.

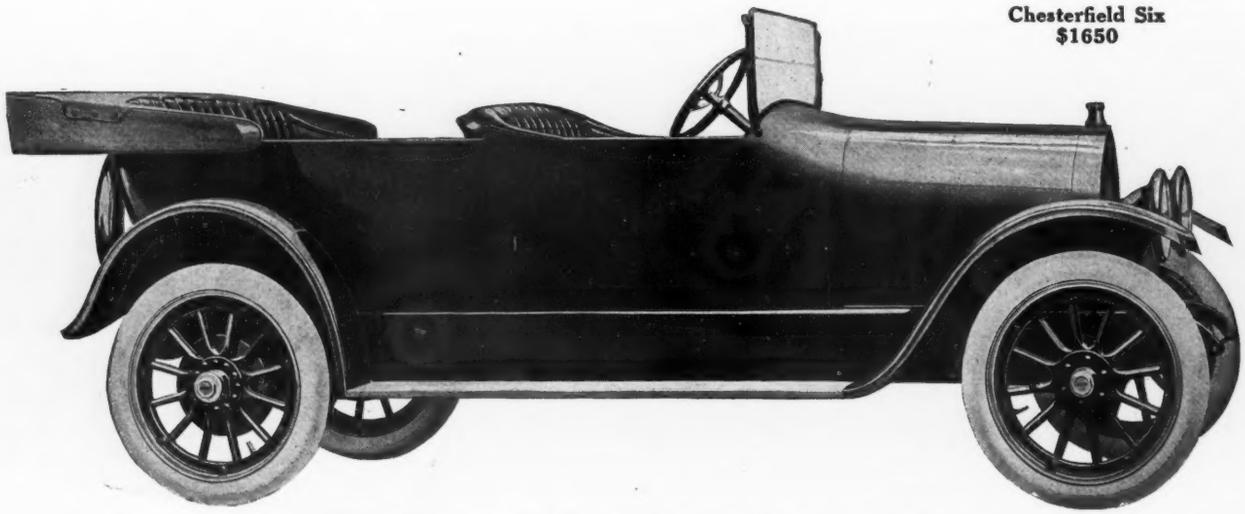


Jeffery Chesterfield Six Worm Drive. 8% more power delivered to rear wheels than in any other type of final drive.

Worm drive, standard on the highest grade electric vehicles and motor trucks where conservation of energy is essential, was introduced in American built gasoline cars by the Jeffery Chesterfield Six. Eight per cent more power delivered to the rear wheels, absolute silence of running and freedom from all adjustments are only a few of its advantages.

Riding comfort, one of the features most carefully considered by the wise purchaser, is developed to a remarkable degree in all Jeffery models. Double coil springs, extra deep cushions, scientifically designed upholstery to fit the back of the occupant, are among the features that add to riding luxury.

Chesterfield Six
$1650



The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

Jeffery has consistently led in developing features of advanced construction that add to the convenience and comfort of owning an automobile and appeal to the best judgment of buyers.

The Thomas B. Jeffery Company
Jeffery
Kenosha, Wis. U.S.A.

Chesterfield

Sales Features

Cantilever springs, reducing a large proportion of unsprung weight and absorbing road shocks in the easy flexure of the spring leaves, make the rear seats as comfortable as the front.

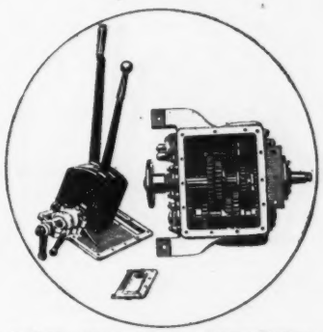
Four forward speeds, found exclusively on the Jeffery Light Four and Chesterfield Six, among cars of equal price, are a first hand mark of highest quality. Easy gear shifting and a wide range of gear ratios to meet varied conditions of driving insure a highly desirable degree of flexibility.

Starting and Lighting are by the Bijur system, accepted by America's most popular high priced cars as the best.

Economy of operation obtained in every day service under ordinary conditions of driving sets the Jeffery in a class by itself. Light weight, easy riding, freedom from overload on the tires and an economical motor put the cost per mile of running well below that of any other car of corresponding size.

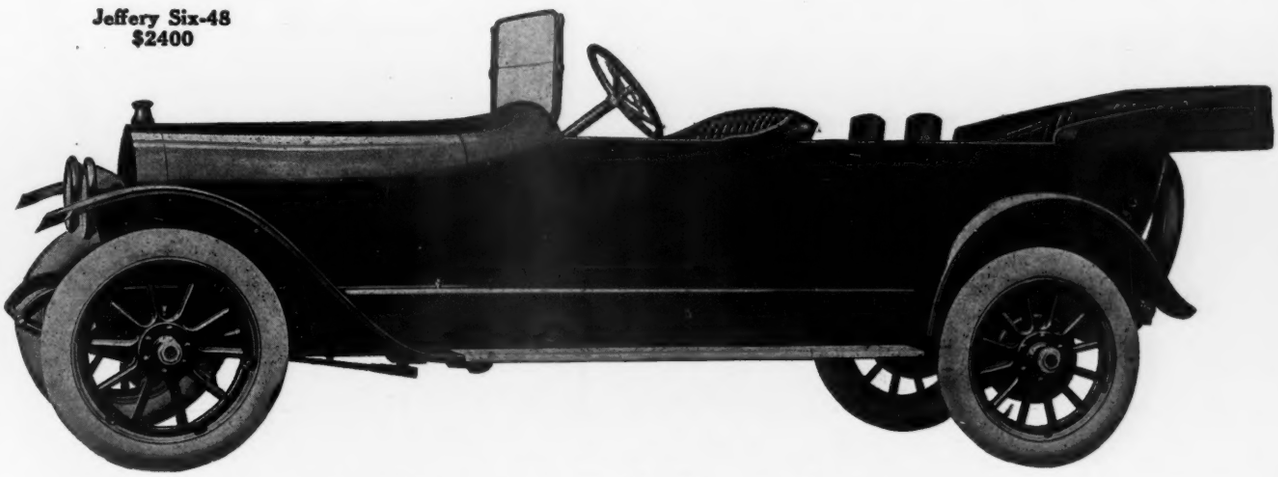
Good style and design reaches the high limit of good taste in the Jeffery Chesterfield Six. A true, sweeping streamline body with a nobby, clean-cut appearance gives an air of exclusive dignity.

Jeffery Upholstery Cushions scientifically curved to fit the back of the occupants and insure freedom from fatigue.



Jeffery Four Speed Transmission. Exclusive on the Jeffery Chesterfield Six and Jeffery Light Four among cars of the same price class.

Jeffery Six-48
$2400



The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

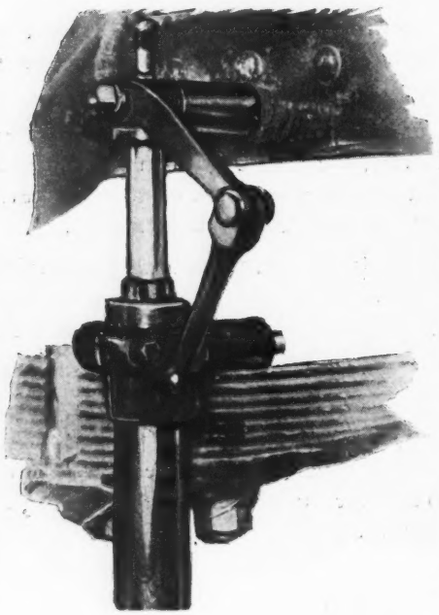
How Will You Motor

The NACO Way — Or The Other Way?

Will you sit back in an easy-riding car and enjoy the comfort and relaxation of real resiliency, or do you prefer jolts, bumps, discomfort, and repair bills?

Real Resiliency
Safety
Economy
Relaxation
Perfect Comfort

Jolts
Bumps
Repair Bills
Depreciation
Discomfort



The NACO Way is the easiest way—it is the path of least resistance. Every bump and shock is smoothed from your road by the NEUTRALIZING EXPANSION PISTON of the NACO mechanism.

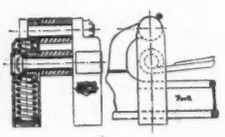
The NACO "Master Control" handles the road, levels the uneven stretches and neutralizes the grind. It insures perfect comfort for the occupants of your car, who often are unable to withstand the bumps you partly overlook.

And by prolonging the life of your springs, the NACO absorbers help keep your machine always in commission — ready for instant use and comfortable riding.

The "other way" is the way to backaches and the repair-shop. The constitutions of many lay motorists refuse to stand the abuse of bad roads—and a day's tour often leads to indisposition that lasts a week or more. Your mother, wife, daughter, and sister must have an easy riding car for the sake of their health, as well as their comfort.

And besides, the machine won't stand the strain long. Bumps and jars to unprotected springs result in repair bills and general depreciation, that soon amounts to more money than a set of NACO Shock Absorbers, that keep things in order.

NACO Shock Absorbers are made in 3 sizes, for cars of 2400 to 4000 pounds, set of 4, $36; for cars under 2400 pounds, set of 4, $30. Rears only, at half price. Ford set of 3, $18.



NACO CUSHION LINKS — NACO Cushion Spring Shackle Links act as auxiliary springs. Unsurpassed for overcoming vibration and jar due to small irregularities of the road. FORD set, $8. Larger sets, $10 to $25.

Dealers — NACO is a money-making proposition. Write for details and agency, today.

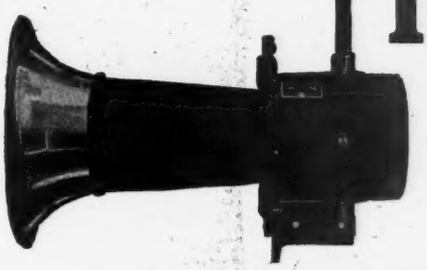
National Appliance Co.
Grinnell, Iowa

THE BEST JOBBER PROPOSITION FOR 1915

COMPARE THESE HORNS WITH ANY OTHERS AND JUDGE FOR YOURSELF

HANDPHONE

HAND-OPERATED

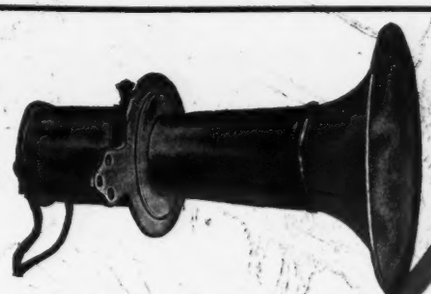


Efficient, Durable, Powerful—Mechanically Perfect and Easy to operate—The slightest touch of the lever gives an instantaneous, loud, penetrating warning. Guaranteed for 3 years.

$6

Made and Guaranteed by the Largest Auto-Horn Makers in the World
The Best Jobber Proposition Made, Write for it

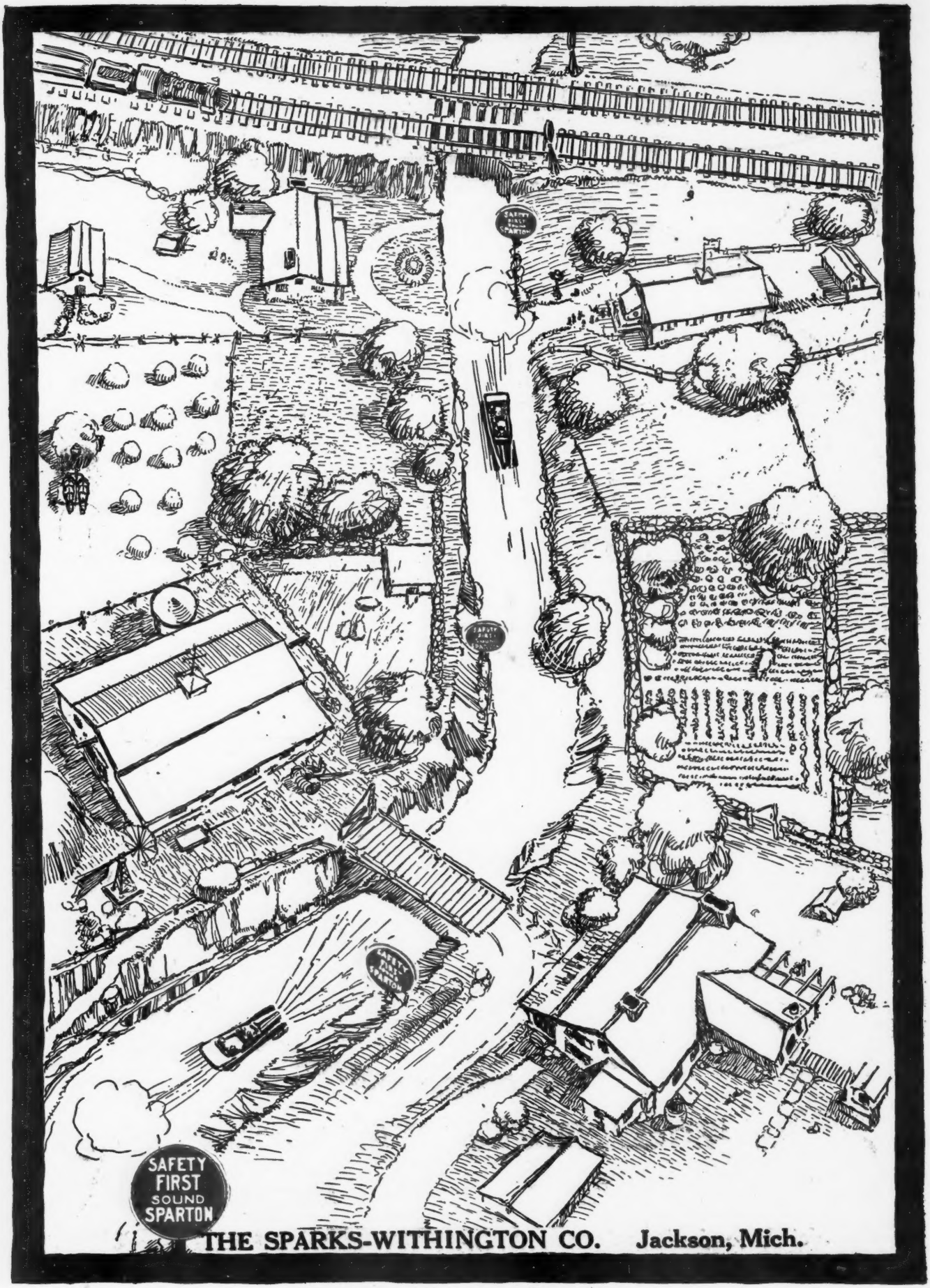
$8 NEWTONE
MOTOR DRIVEN
SUPERIOR



The Best Motor-Driven Horn at any price—It has a wonderful volume of sound with a minimum current consumption.

SEE US AT THE CHICAGO SHOW
BEFORE YOU PLACE
YOUR ORDERS

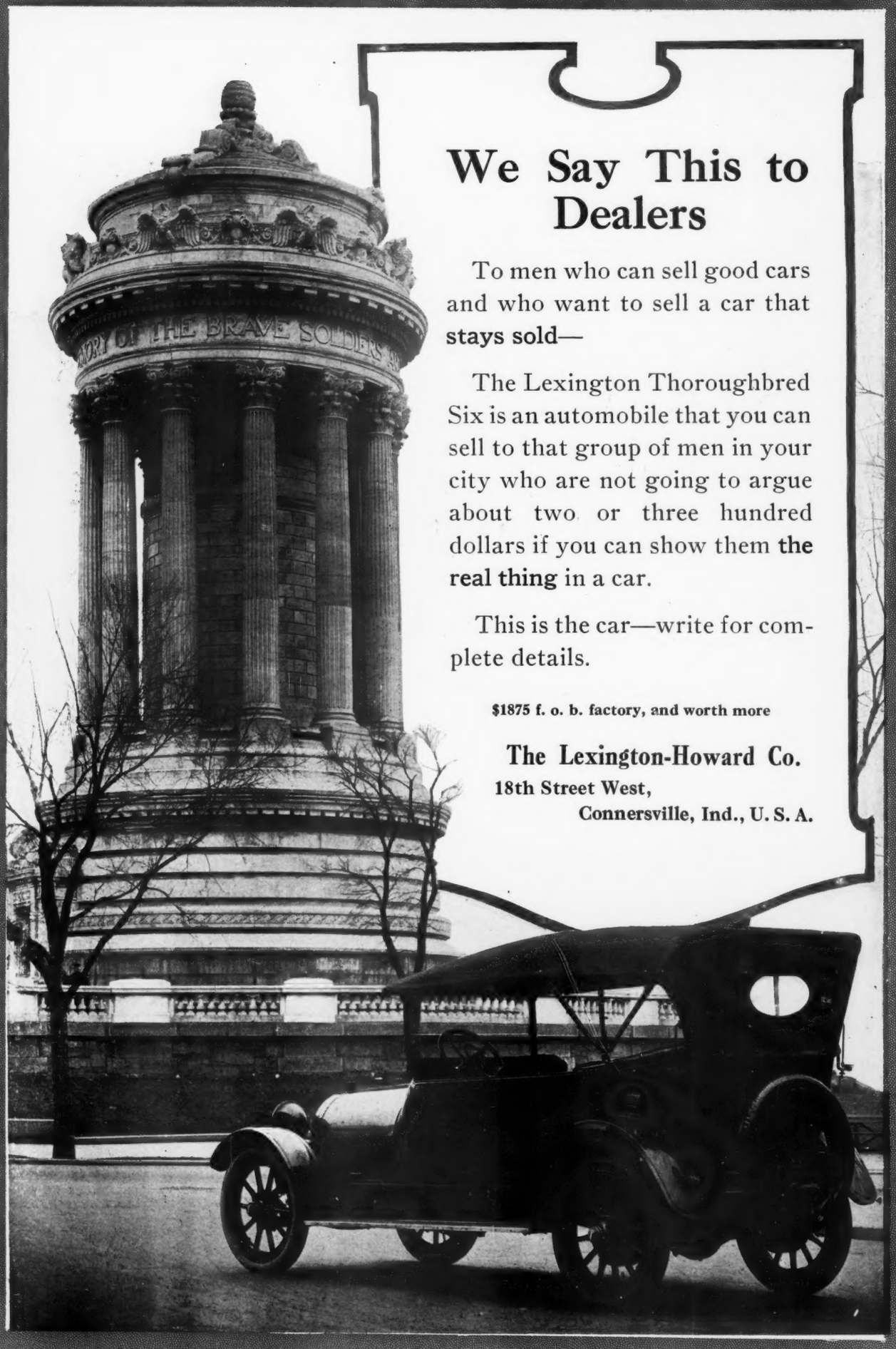
THE AUTOMOBILE SUPPLY Manufacturing Co.
220 Taaffe Place Brooklyn, N.Y.


SAFETY
FIRST
SOUND
SPARTON
THE SPARKS-WITHINGTON CO. Jackson, Mich.

Lexington
We Say This to You
The owner of a Lexington Thoroughbred SIX has made an investment in automobile quality—style—service and comfort that justifies him in saying to his friends:
"Pay the price—buy a real car—buy this one. It is the best piece of automobile construction in America for the money."
$1875 f.o.b factory, and worth more
The Lexington-Howard Co.
18th Street West, Connersville, Ind., U. S. A.
See us at the Chicago Show, at Spaces E-5 and 6, Armory Building

The most remarkable
We Also Say This To You
This automobile has been built for men who want better quality—better design— better engineering and better workmanship than is obtainable in the ordinary six-cylinder car.
This is an extraordinary car and we will prove it to the man who knows good automobiles and buys only that kind.
Price $1875 f. o. b. factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North, Connersville, Ind., U. S. A.

"Six" ever built!
And This Will Interest You
The Lexington Thoroughbred Six is a perfect, silent, smooth-running car at all speeds and at all times.
When it is new—after six months—on its first birthday, and long afterwards.
We have built into this car the kind of materials—the kind of metals and the kind of machinery that does its duty and stands up because of supreme lasting quality.
Price $1875 f. o. b. factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North, Connersville, Ind., U. S. A.



We Say This to Dealers

To men who can sell good cars and who want to sell a car that **stays sold**—

The Lexington Thoroughbred Six is an automobile that you can sell to that group of men in your city who are not going to argue about two or three hundred dollars if you can show them **the real thing** in a car.

This is the car—write for complete details.

$1875 f. o. b. factory, and worth more

The Lexington-Howard Co.
18th Street West,
Connersville, Ind., U. S. A.

Whatever size or length your motor requires—whatever type you prefer—you will find it in the Happy Family of Red Heads.

Every Red Head Spark Plug is guaranteed—not for one year—but forever.

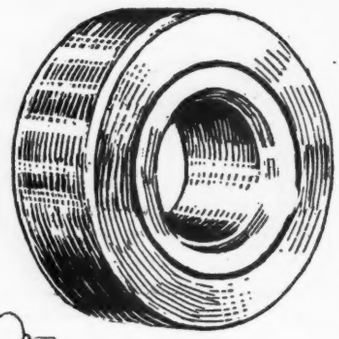
Printed guarantee packed with each plug.

P. S. to Dealers. Think of the business economy in handling one nationally advertised line that will satisfy all of your customers.

Emil Grossman M'f'g Co. Inc.

BUSH TERMINAL—Model Factory No. 20 *BROOKLYN (New York City)*

CHICAGO—2615 Michigan Ave.

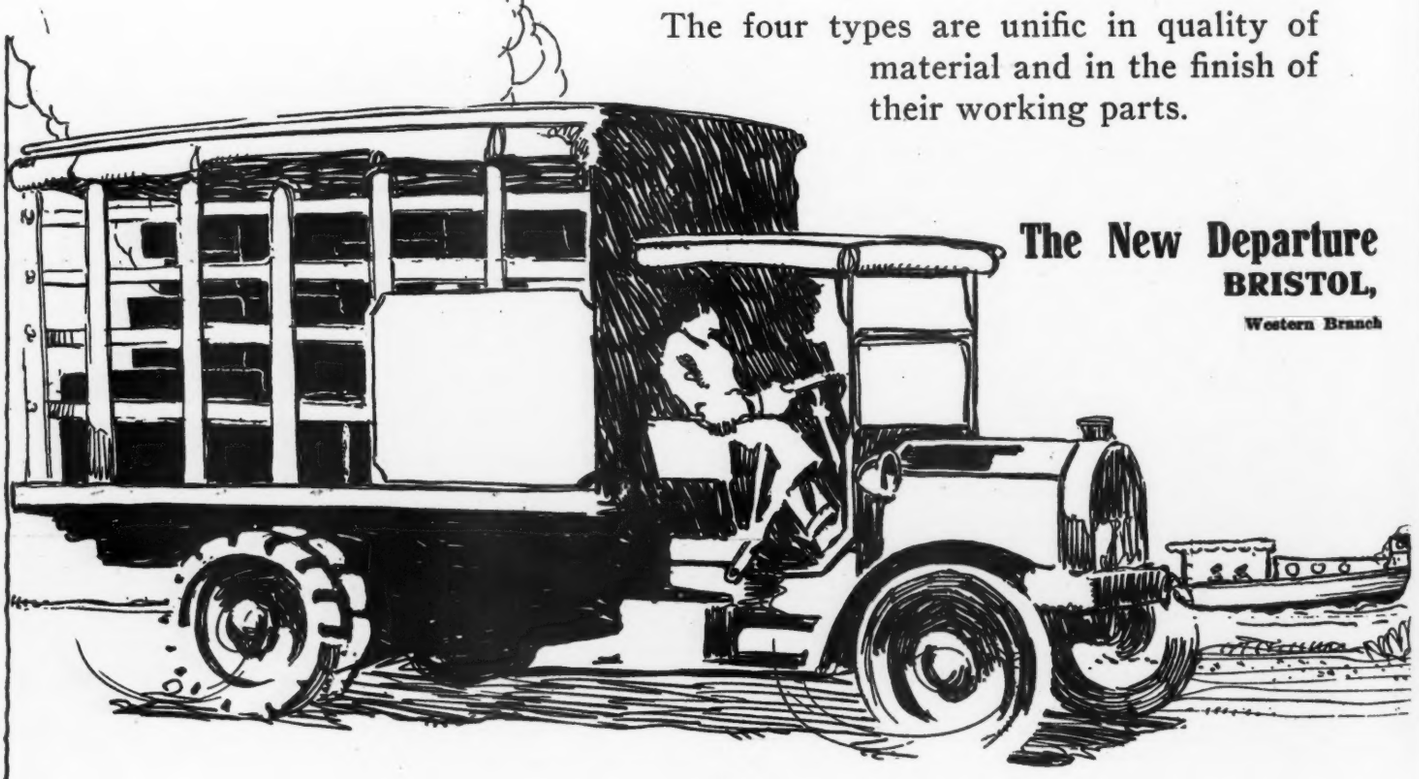


NEW DEPARTURE
The Elimination of Friction fol Bearings in Motor Driven Craft

NEW DEPARTURE Ball Bearings are the product of a New England manufactory which for a quarter of a century has enjoyed a world wide reputation for the quality of its product, the up-to-dateness of its equipment and manufacturing methods, and the soundness of its standards and policies.

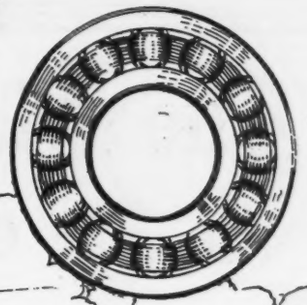
There are four types of New Departure Ball Bearings —The Double Row, a combined radial and thrust bearing; The Single Row, strictly radial; Radax, a perfected cup and cone bearing, taking radial loads and thrust from one direction; The Magneto, used in magnetos and other devices where high speeds develop.

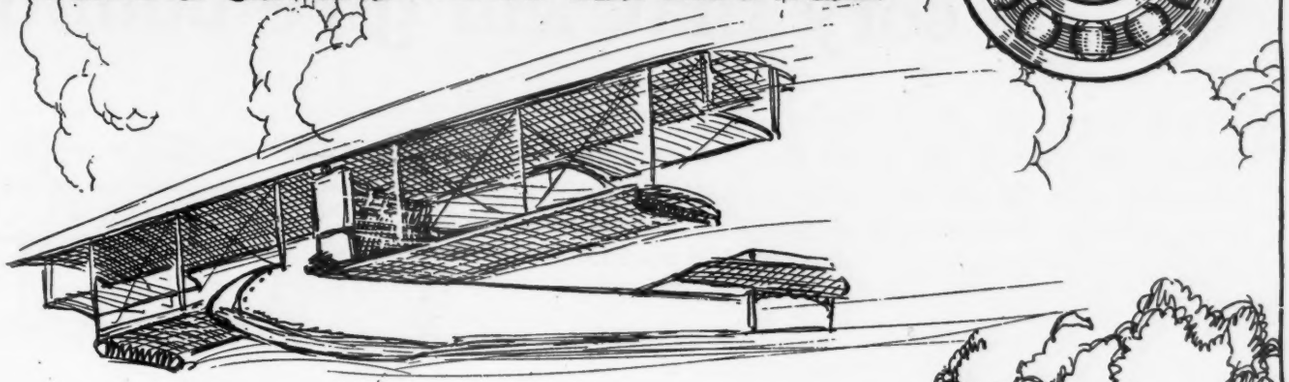
The four types are unific in quality of material and in the finish of their working parts.



The New Departure
BRISTOL,
Western Branch

BALL BEARINGS
lows the use of these Quality on Land and Sea or in the Air



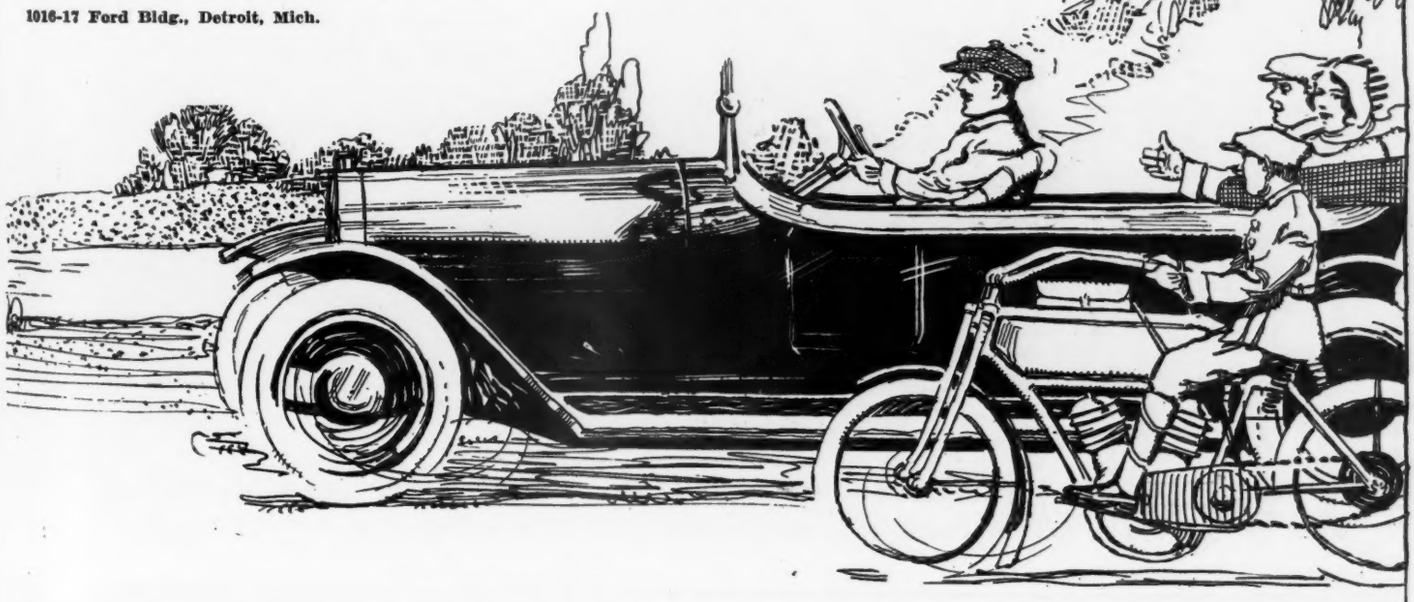


Our present capacity is more than 20,000 bearings per day.

Each type is stocked in quantity and made in such variety of size that there is available a New Departure for every purpose—a size for every need.

Manufacturing Company
CONN., U. S. A.

1016-17 Ford Bldg., Detroit, Mich.



The Manzel Pump for Ford cars
sory that will give comfort-

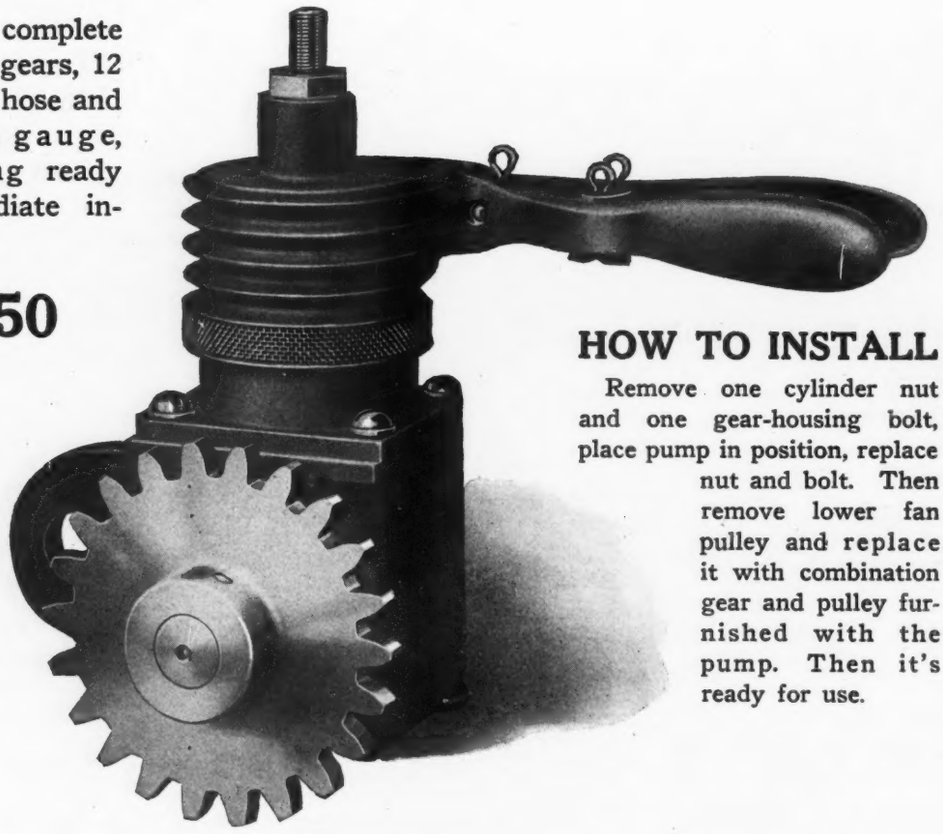
We know, Mr. Ford Owner, that you are keenly anxious to get rid of the tire-pumping burden. We know that you have been waiting for just this kind of pump—one that you can install yourself, and when once on your machine is there to stay—an always-attached pump, always ready for work, that you do not have to put on and take off every time you use it.

ENGINE-DRIVEN
MAN

The Manzel Ford Pump is an accurately built, all metal, engine-driven tire pump that will inflate any Ford tire in a minute and a half, and with only pure air. We furnish it with complete equipment, ready for immediate installation.

Price, complete with steel gears, 12 feet of air hose and pressure gauge, everything ready for immediate installation,

$7.50



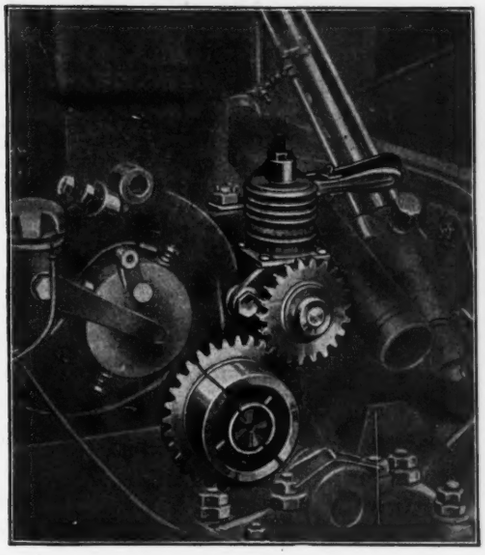
HOW TO INSTALL

Remove one cylinder nut and one gear-housing bolt, place pump in position, replace nut and bolt. Then remove lower fan pulley and replace it with combination gear and pulley furnished with the pump. Then it's ready for use.

You can put it on in 45 minutes—there are no holes to drill, no machine work of any kind to do. It is simplicity itself. It has a positive gear drive—therefore, no slipping of

is a valuable and practical acces- dividends to Ford owners

ZEL TIRE PUMPS

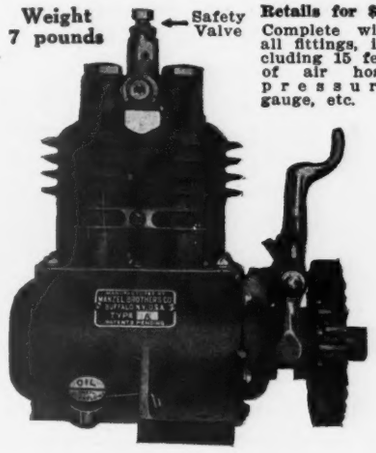


belts, no spark plugs to remove. It is attached to the side of the motor in the most convenient position. To operate attach the hose to pump and tire, throw the gears into mesh and start the engine.

See this pump at your dealer's. Check up its points against our claims for it. Then you'll invest its purchase price, $7.50, and begin to draw comfort-dividends.

For Larger Cars Use the Manzel Two-Cylinder Engine-Driven Pump

We make the unqualified assertion that it is the best tire pump on the market where **capacity** is the important factor. This pump will inflate the largest tire to its indicated pressure in less than three minutes—with pure air, too. There's no chance of a blowout, either. Our unique safety valve takes care of that. It is "built like an engine"—as precisely machined, as accurately fitted as the finest part of your motor. You install it yourself—you don't need a mechanic. A screwdriver, a file and a wrench are all the tools you need—and you can put the pump on in less than an hour.



We ask you to go to your dealer and compare it, piece by piece, with your motor parts—and then you will buy one. Thousands of motorists have already done so, the increased sales thus made allowing us to effect manufacturing economies that enable us to reduce the price from $28 to

$20 complete with all fittings, including 15 feet of air hose, pressure gauge, etc.

MANZEL BROTHERS COMPANY 308 Babcock Street Buffalo, N.Y.

Leaders, for 16 years, in the manufacture of quality oil pumps for heavy duty steam and gas engines

We carry in stock fittings for the following cars:

Abbott-Detroit, Buick, Cadillac, Cartercar, Case, Chandler Six, Chalmers, Cole, E.M.F., Franklin, Hudson, Imperial Six, KisselKar, Maxwell, Michigan, Mitchell, Oakland, Oldsmobile, Overland, Packard, Paige-Detroit, Rambler Cross Country, Reo, Simplex, Speedwell, Studebaker, Stutz, Velie and others.

The PENALTY OF LEADERSHIP

IN every field of human endeavor, he that is first must perpetually live in the white light of publicity. ¶ Whether the leadership be vested in a man or in a manufactured product, emulation and envy are ever at work. ¶ In art, in literature, in music, in industry, the reward and the punishment are always the same. ¶ The reward is widespread recognition; the punishment, fierce denial and detraction. ¶ When a man's work becomes a standard for the whole world, it also becomes a target for the shafts of the envious few. ¶ If his work be merely mediocre, he will be left severely alone—if he achieve a masterpiece, it will set a million tongues a wagging. ¶ Jealousy does not protrude its forked tongue at the artist who produces a commonplace painting. ¶ Whatsoever you write, or paint, or play, or sing, or build, no one will strive to surpass or to slander you, unless your work be stamped with the seal of genius. ¶ Long, long, after a great work, or a good work has been done, those who are disappointed or envious, continue to cry out that it can not be done. ¶ Spiteful little voices in the domain of art were raised against our own Whistler as a mountebank, long after the big world had acclaimed him its greatest artistic genius. ¶ Multitudes flocked to Bayreuth to worship at the musical shrine of Wagner, while the little group of those whom he had dethroned and displaced, argued angrily that he was no musician at all. ¶ The little world continued to protest that Fulton could never build a steamboat, while the big world flocked to the river banks to see his boat steam by. ¶ The leader is assailed because he is a leader, and the effort to equal him is merely added proof of that leadership. ¶ Failing to equal or to excel, the follower seeks to depreciate and to destroy—but only confirms once more the superiority of that which he strives to supplant. ¶ There is nothing new in this. ¶ It is as old as the world and as old as the human passions—envy, fear, greed, ambition, and the desire to surpass. ¶ And it all avails nothing. ¶ If the leader truly leads, he remains—the leader. ¶ Master-poet, master-painter, master-workman, each in his turn is assailed, and each holds his laurels through the ages. ¶ That which is good or great makes itself known, no matter how loud the clamor of denial. ¶ That which deserves to live—lives.

Cadillac Motor Car Co. Detroit, Mich.

Copyright 1914, Cadillac Motor Car Co

SAFETY IS TOO DEAR TO BECOME YOUR STAKE IN A GAMBLE

Just as good brake lining as Raybestos does not exist—neither in quality of materials and honesty of workmanship, nor in efficiency and duration of service

THE QUALITY OF RAYBESTOS IS WORTH WHILE

Raybestos is the product of Brake Specialists.

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

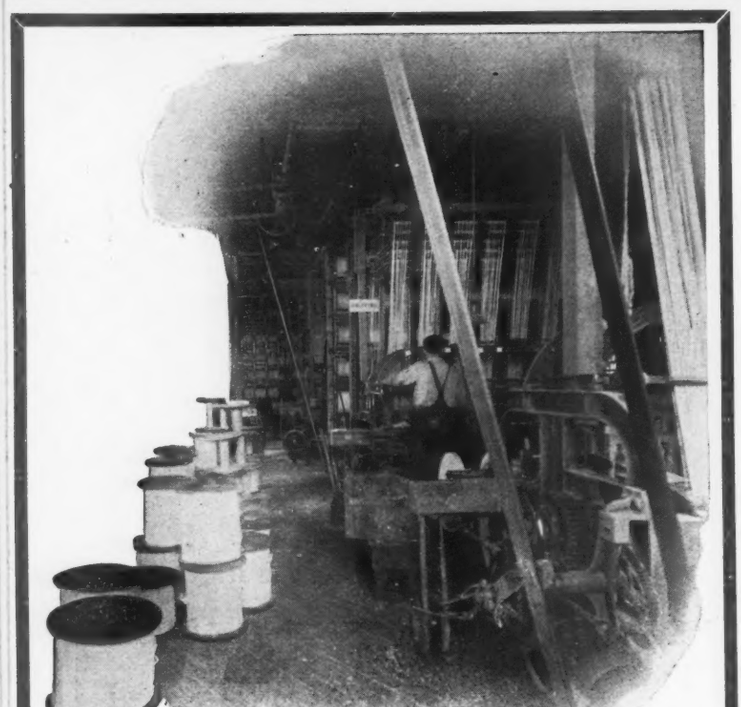
"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"
It Stands The Test

Raybestos is backed by a guarantee of perfect service for one year from the date it is put on a car.

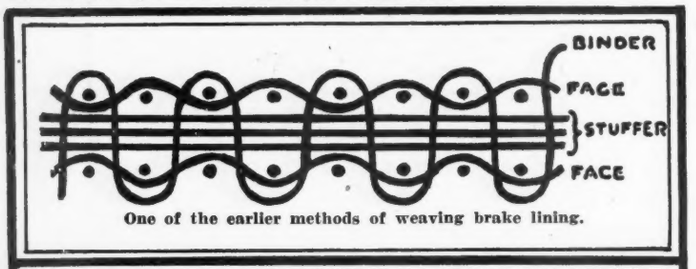
Manufactured by
The Royal Equipment Co.
1360 Bostwick Avenue
Bridgeport Connecticut

Insist on getting the kind with the silver edges. Sold by all leading dealers.

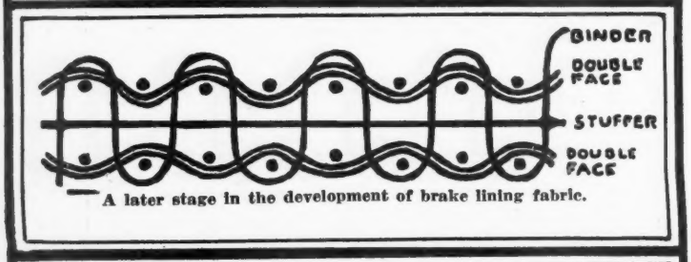
74-Z



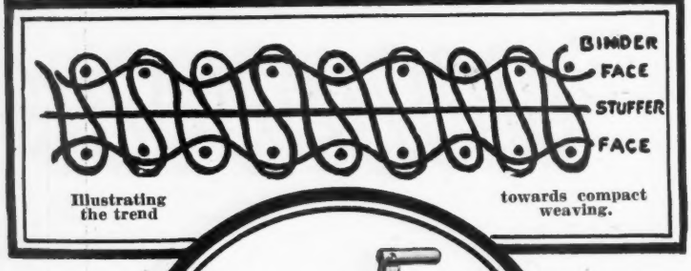
RAYBESTOS is—and always has been—made of the highest quality of long fibre asbestos spun in the form of yarn around wire.



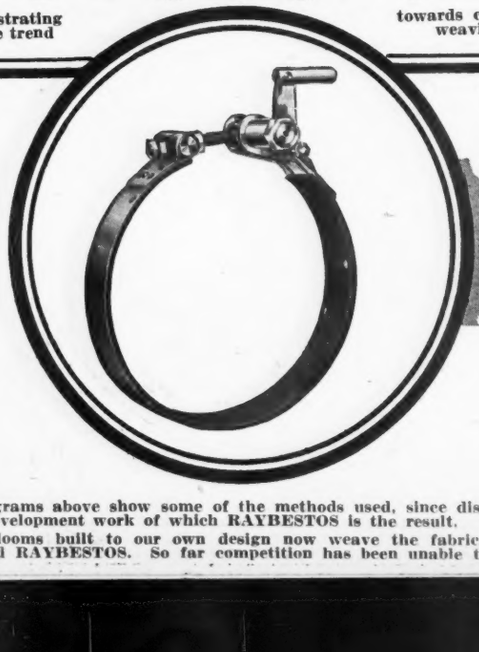
One of the earlier methods of weaving brake lining.



A later stage in the development of brake lining fabric.



Illustrating the trend towards compact weaving.



The diagrams above show some of the methods used, since discarded by us, in the development work of which RAYBESTOS is the result.

Special looms built to our own design now weave the fabric we have trade-marked RAYBESTOS. So far competition has been unable to copy it.

Raybe

The PRODUCT of BI AK

Sold by nearly every le mobiles or automobile s

You will know it by its silvered edges. T every foot of it distinguishes RAY BE

RAYBESTOS is the product of brake specialists

Our first activity as manufacturers was in the design, development and production of automobile brakes and brake mechanism.

During our whole business career we never have been guilty of producing a brake mechanism which our experience told us was not what it should be.

This same thoroughness is characteristic of our brake lining business. We never have taken a short cut to fortune if it involved the slightest chance of sacrificing the quality of our product.

No other concern in this country making brake linings has ever designed or produced brakes or brake mechanisms, and their knowledge of the problem they are undertaking to solve in the production of brake lining is not founded on nearly so practical a basis as that which underlies the design, development and manufacture of RAYBESTOS.

For this reason you should insist on RAYBESTOS.

Raybestos is the Pro d

GUARANTEE *If from*

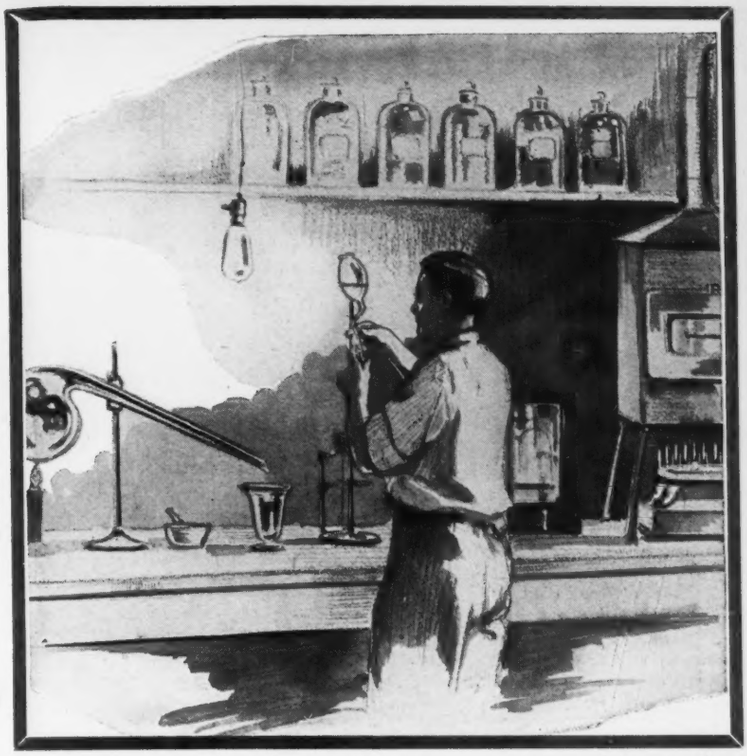
furnish new lining without charge. :: weights of pleasure cars and to all light

estos

RAKE SPECIALISTS

leading dealer in auto-supplies.

This and our trade-mark stamped on BESTOS from the ordinary kind

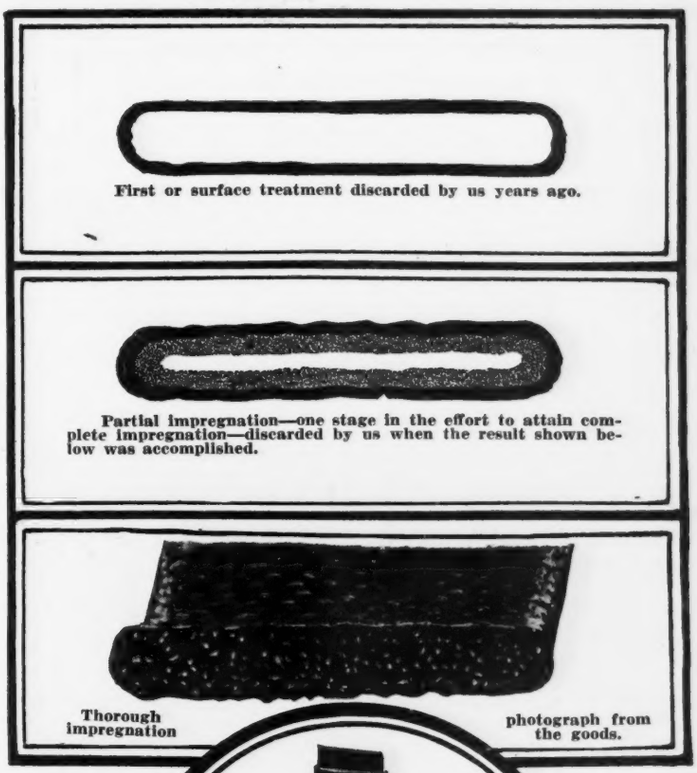


Successive stages of treatment which led up to the thorough impregnation of RAYBESTOS with our famous heat and wear resisting compound.

The efficiency of RAYBESTOS as a brake lining is beyond question

The most unfair competition cannot find a single weakness in it. Every strand in RAYBESTOS is woven and interlocked, one with another, into a homogeneous fabric of great tensile strength and solidity. With our improved machinery we attain a remarkably even thickness, which insures the uniformity of grip so necessary to the successful operation of automobile brake mechanism.

The most severe test any brake lining can get comes with its use on Motor Fire Apparatus. Fire Engines, Ladders, Chemicals, Hose Wagons, Patrols, etc., average in weight as much as the ordinary truck and far more than the heavy types of pleasure cars. They travel at a speed higher than ordinarily is attained by either trucks or pleasure cars. Fast runs with quick application of brakes for turning street corners and stopping are characteristic of their every-day usage. It is significant that nine out of ten motor fire vehicles of one kind or another in the United States are equipped with RAYBESTOS. This service is extraordinary, but there is no detail of an automobile which should be provided with any greater factor of safety than the brake mechanisms. No brake is any better than its lining.



First or surface treatment discarded by us years ago.

Partial impregnation—one stage in the effort to attain complete impregnation—discarded by us when the result shown below was accomplished.

Thorough impregnation

photograph from the goods.

duct of Brake Specialists

RAYBESTOS fails to last one full year the time it is placed on the car, we will This guarantee applies to all types and trucks.

The chemical treatment of RAYBESTOS is the really important factor which enables us to guarantee unqualified service from RAYBESTOS for one full year from the date it is put on the car.

In spite of this superior service we are constantly experimenting to im-

How to Get the Bulk of the Brake Lining Business

To Dealers:

Sell the Brake Lining you would buy yourself.

If you follow this plan you will build up a better business and make more money in the end.

Look at it from your customer's standpoint. They know that the quality of RAYBESTOS is supreme. They know that its service is superior to that of any other brake lining. They know that it is backed by the most comprehensive guarantee ever given any brake lining.

These factors are more potent in swinging the bulk of the brake lining business to you than any other consideration.

Getting the benefit of the prestige, quality and service of RAYBESTOS to help build up your business is worth far more to you than a little longer discount on some other brand of brake lining. Longer discounts are aimed to attract you.

Your customers do not benefit.

You cannot give them any better quality — nor more attractive prices. Service in a brake lining is what they want. Service and a cut price never yet went hand in hand. The quality—the prestige—and our business-like methods of distributing RAYBESTOS constitute too much of an asset to you for you to be tempted by smart selling methods.

RAYBESTOS discounts are fixed—the same to each and every dealer. We believe in a square deal for everybody and we treat everybody exactly alike.

Quality is put into RAYBESTOS to insure service. The service of RAYBESTOS is definitely guaranteed. In every big city in this country there is a good, reliable concern which carries a complete stock of RAYBESTOS, ready to supply your needs on telephoned, telegraphed or written order. Any one of these concerns will quote our standard discounts to the trade—their discounts are the same as we would quote you direct. Their nearness to you, and their ability to make immediate deliveries of either large or small quantities, makes it unnecessary for you to carry more than an easily handled stock for your immediate requirements.

THE ROYAL EQUIPMENT COMPANY

1354 BOSTWICK AVENUE, :: :: BRIDGEPORT, CONNECTICUT

STUTZ

America's
Road Race Champion

In four years the STUTZ has achieved more road race victories than any other car has in the last ten years.

The Los Angeles-Phoenix 696-mile road race—conceded to be the stiffest competitive test ever held in the history of motoring—was won by the STUTZ.

The San Diego Exposition 305-mile road race—the first important race of the new year—was won by the STUTZ.

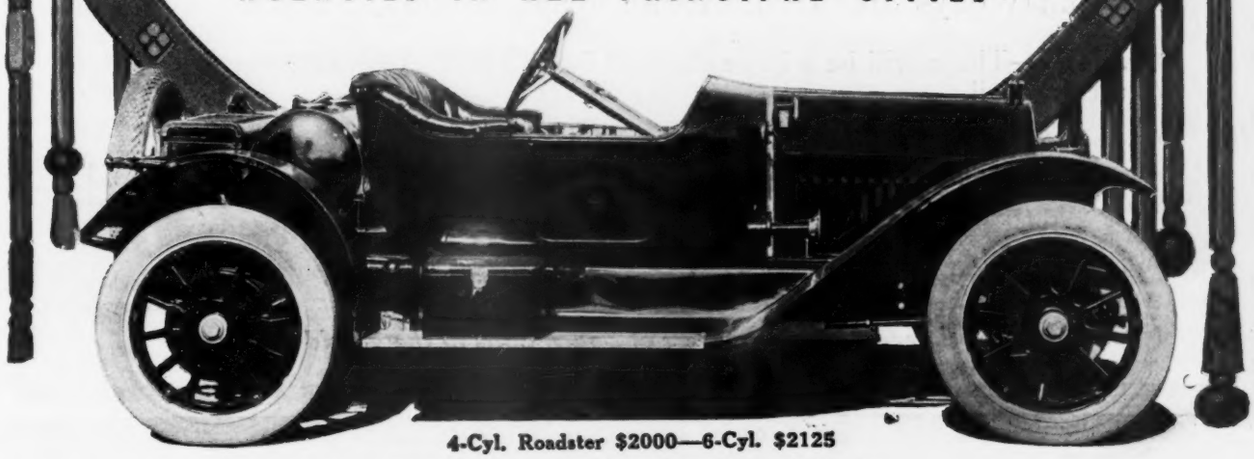
The STUTZ meets victoriously the gruelling requirements of the race-course simply because it is built to meet *superlatively* the ordinary demands of 365-day-in-the-year service.

4-CYLINDER MODELS		6-CYLINDER MODELS	
$1475 H. C. S.	**$2250 Bulldog**	**$2125 Bearcat**	**$2400 Touring**
$2000 Bearcat	**$2275 Touring**	**$2125 Roadster**	**$3800 Sedan**
$2000 Roadster	**$3675 Sedan**	WRITE FOR CATALOGUE	

At the Chicago Show, Coliseum Annex, Space P-I.

Dealers—Investigate the complete STUTZ line before closing contracts.

STUTZ MOTOR CAR COMPANY
Indianapolis, Indiana
AGENCIES IN ALL PRINCIPAL CITIES



4-Cyl. Roadster $2000—6-Cyl. $2125

ANNOUNCEMENT

KINGSTON

Single Vibrator Coil *for* Ford 1914-15 Cars

Only One Vibrator Adjustment

A Perfect, Even Spark at Every Plug

Why Use Four Vibrators When One Will Work Far Better?

IT fits in the metal coil box used on 1914 and 1915 Ford cars. Just take out the four vibrating units, slip in the KINGSTON SINGLE VIBRATOR COIL and notice the difference.

It will solve all Ford ignition troubles. The spiral spring on the vibrator will not allow the contact points to stick.

Thirty days' free trial. Write for particulars.

AGENTS—There will be a large demand for this coil. Write for our proposition by return mail.

Kokomo Electric Company, Kokomo, Ind.

Space 64 Chicago Show

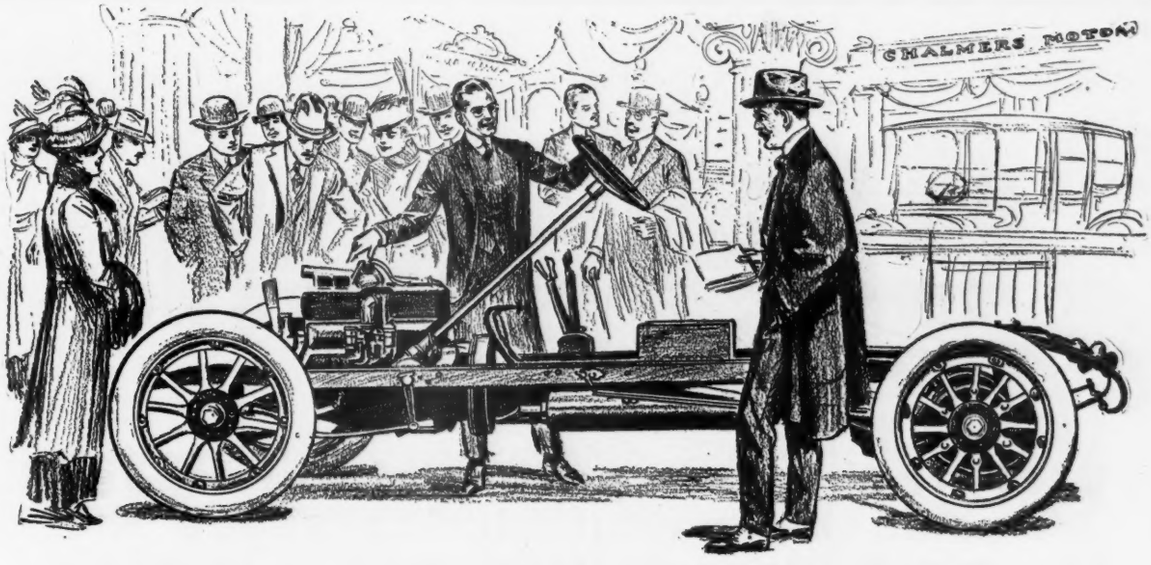
New York Branch 1733 Broadway

Los Angeles Branch 334 W. Pico St.

Detroit Branch 650 Woodward Ave.

Chicago Branch 1430 Michigan Ave.

Largest Manufacturers of Spark Coils in the World



Why We Had a Chalmers Stripped Chassis at the Show

You know that it's what is underneath the paint and polish that constitutes the real value of an automobile.

We won't even try to elaborate upon the good looks of the Chalmers "Light Six" at $1650—though it is a wonderfully handsome car.

And we don't think you'll let any salesman—no matter how enthusiastic he may wax upon the beauty of his car — convince you that automobile quality is measured by appearance.

Most cars look mighty well standing in the salesroom window. But some of them present a different picture when they are actually in service.

The only real way to get a line on what a car is going to do for you after you've bought it is to see how it is made. Don't take any one's word for it, but actually inspect the construction of the car yourself.

We've said before—and without denial—that the Chalmers "Light Six" at $1650 is the greatest automobile value in its class.

And the only way we know to prove this to you absolutely conclusively is simply to let the chassis speak for itself.

This car is built so well — is so far superior to any other priced within several hundred dollars of it — that there is simply no argument.

As a matter of interest to you we can say that this "Light Six" has proved in the hands of over 4,000 owners this past season that it is the most economical "light six" on the market.

Now its big saving isn't in gasoline. There are probably several "light sixes" that consume as little gasoline in a season. Nor is it in oil. But, of course, oil is a negligible expense item anyway. A gallon will last you for hundreds of miles.

The big economy is in repairs. Think what that means —the most economical "light six" of the season is the one that cost least in repairs. The answer is — it must be built better. And that is the real reason why the Chalmers "Light Six" at $1650 is a bigger value than any other "light six" anywhere near it in price.

So we laid our cards on table. We put a stripped chassis of this great car in our booth at the Motor Show. And we said we'd rest our case if you would make your choice after seeing this chassis and comparing it with others you may know.

Go to the nearest Chalmers dealer—see this great car for yourself—let him point out the features of superiority that make it the greatest "light six" value on the market.

CHALMERS · MOTOR · CO. Detroit, Mich. U.S.A.

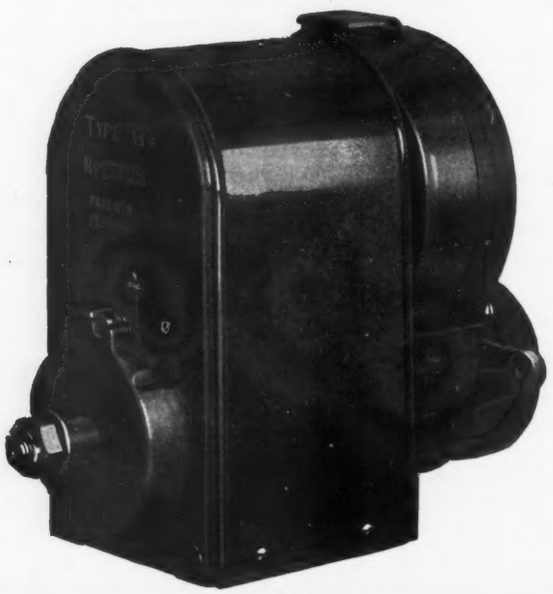
Quality First

Chalmers Motor Company, Detroit

EISEMANN

WITH the occupation of our latest additional manufacturing space the Eisemann Magneto Company is in position to assist American manufacturers by assuring them prompt deliveries in taking care of rush orders. Within the last week this ability to make prompt shipments was demonstrated in the case of a big truck order the acceptance of which was predicated practically upon our ability to make almost immediate shipment of a special lot of instruments. We made good and the order was closed.

Needless to say the vast increase of capacity has affected the quality of the Eisemann output only to the extent of making it stand out more prominently than ever in its admitted superiority. The reconstruction of the factory, made necessary by the first enlargement last summer, brought about the installation of better and more advanced machinery which made possible the production of the greatest advancement known to the ignition world—the new Eisemann Type G-4 single ignition,



EISEMANN

waterproof, high tension magneto. Simplicity personified is the keynote of the construction of this new Eisemann product. It is the most accessible, most efficient instrument that has ever been produced, and we are willing to base our contracts on actual tests of this literal statement.

The principal features of simplification are to be found in the new contact breaker which is patented; the method of carrying the high-tension current direct from the collector ring to the distributor without the use of unnecessary brushes and conductors; the method of attaching the cables inside of the magneto and a general elimination of parts by a remarkably clever new design.

And in the increased simplicity and accessibility this new model has also gained much in efficiency. Waterproof, dustproof and practically foolproof, it is the greatest step forward yet recorded by the Eisemann Company in the maintaining of its reputation for efficiency, reliability and durability.

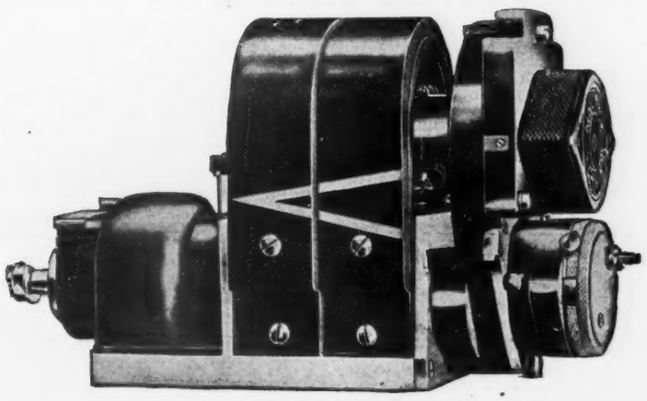
The Eisemann Magneto Co.

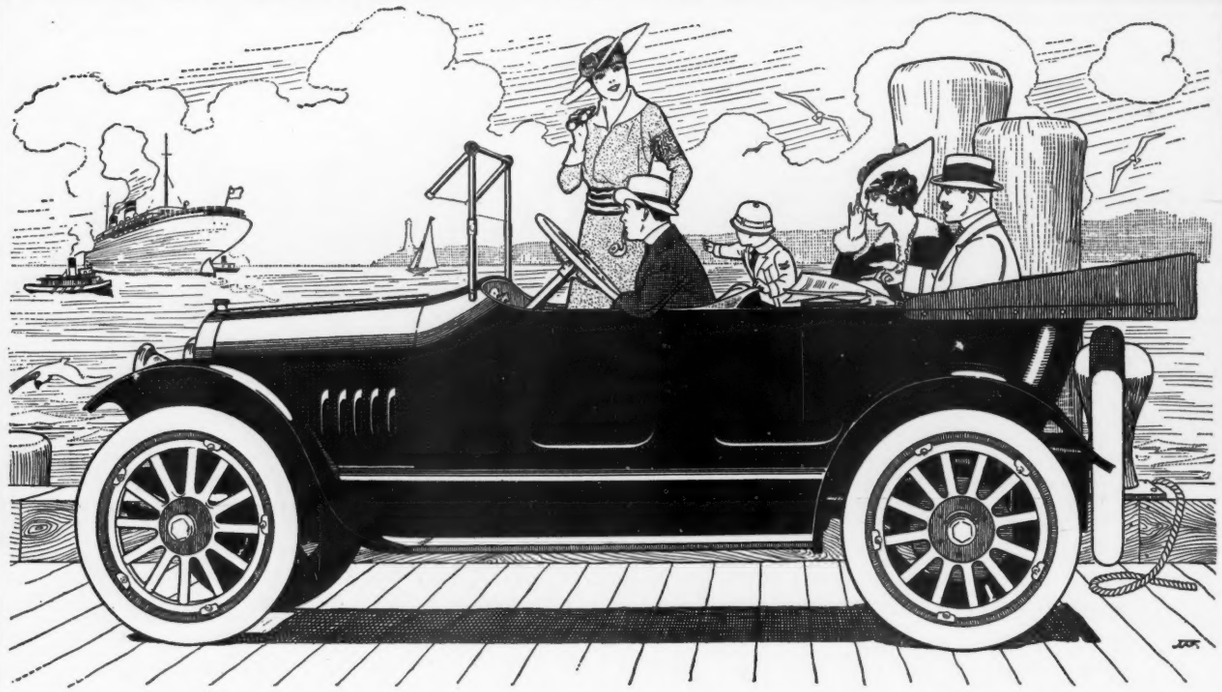
Sales and General Offices: 32-33d Street, Brooklyn, N. Y.

NEW YORK:
245 West 55th Street

INDIANAPOLIS, IND :
415-417 N. Capitol Avenue

DETROIT, MICH.:
802 Woodward Avenue





EIGHT CYLINDER

KING

for $1350 *complete*

F. O. B. DETROIT

You are Spoiled for Other Cars after a ride in this Eight

One Demonstration will Prove this Statement

Flexibility—From two to fifty miles an hour without gear changing.

Silence—No noise or vibration because of continuous flow of power (result of eight cylinders and their arrangement), and lighter engine parts.

Economy—In spite of its 40-45 horse-power, this car is as saving in gasoline, tires, repairs, etc., as a moderate-weight Four.

Roominess—Because of wonderfully compact power plant, has more room in body than a Six of 119" wheel base.

Easy Turning Length—The 113" wheel base is a great convenience in city streets, yet the body room is generous.

Durability—This type of car has amazing longevity. Vibration and weight wear a car down; this car has neither.

Accessibility—No other Eight is so "get-at-able" as the King. Comparison instantly proves this.

Comfort—The famous King Cantilever Springs insure perfect riding comfort without use of shock-absorbers.

Equipment—is complete and includes the Ward Leonard starting and lighting system and an engine-power tire-pump.

Distinction—There is real distinction in owning an Eight. It is the *super-car* of motordom. Will you be the first in your town or neighborhood?

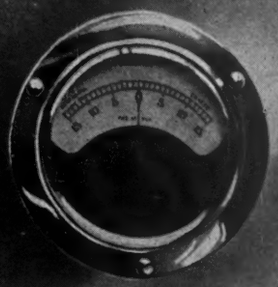
Dealers—Applications for territory will be considered strictly in the order received

KING MOTOR CAR COMPANY, 1300-1324 Jefferson Avenue, Detroit, Mich.

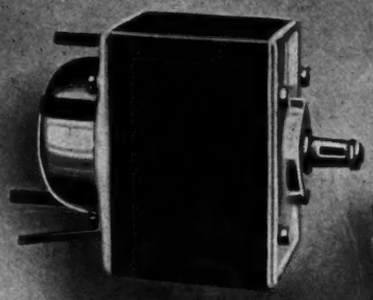
New York Agency and Showroom, Broadway at 52nd Street

New York Service Department, 250 West 54th Street

APELCO



AMMETER



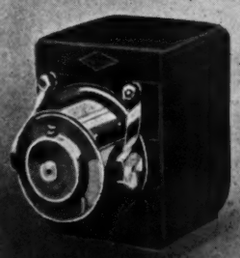
MOTOR AND DYNAMO IN ONE UNIT

AUTOMATIC SWITCH

Electric Starting and Lighting System for *Ford* Cars

"The most compact—the most serviceable for the *Ford* owner" has been the designing and manufacturing dictum, while absolute utility has been the keynote for the strenuous and exhaustive tests the system has undergone to pronounce its fitness for hard service.

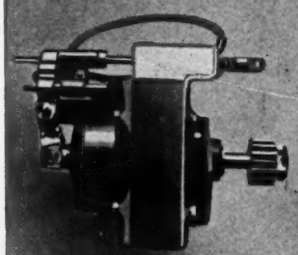
In unique features of construction and application—**absolutely no machine work is necessary to make an installation**—the manufacturers of the APELCO outfits have satisfied themselves with the merits of their *Ford* Starting and Lighting unit.



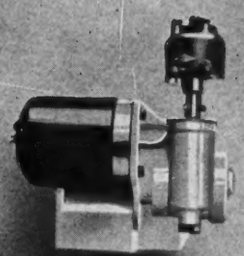
LIGHTING GENERATOR

Everything an Owner Needs for Installation, $85.00

Send or write for a fully illustrated booklet



MOTOR AND STARTING SWITCH



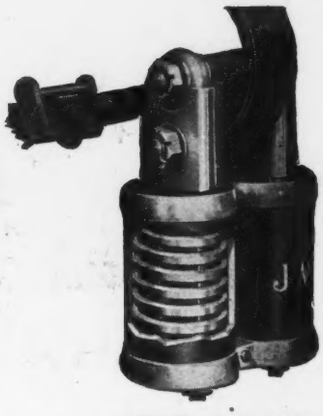
GENERATOR AND TIMER DISTRIBUTOR

APELCO DISTRIBUTING STATIONS

ATLANTA....10-12 E. Harris St.	LOS ANGELES..1215 S. Hope St.
BOSTON.....1112 Boylston St.	MINNEAPOLIS.....34 S. 8th St.
CHICAGO.....64-72 E. 14th St.	NEWARK.....290 Halsey St.
CINCINNATI.....811 Race St.	NEW YORK....18-20 W. 63rd St.
DALLAS.....402 S. Ervay St.	PHILADELPHIA..210-12 N. 13th
DAYTON.....427 East 3rd St.	SAN FRANCISCO..1028 Geary St.
DETROIT....972 Woodward Ave.	SEATTLE.....1628 Broadway
KANSAS CITY...1827 Grand Ave.	TORONTO.....469 Yonge St.
LONDON	BUENOS AIRES

Factory: NEWARK, NEW JERSEY

J. M. SHOCK ABSORBER
wins final favorable decision

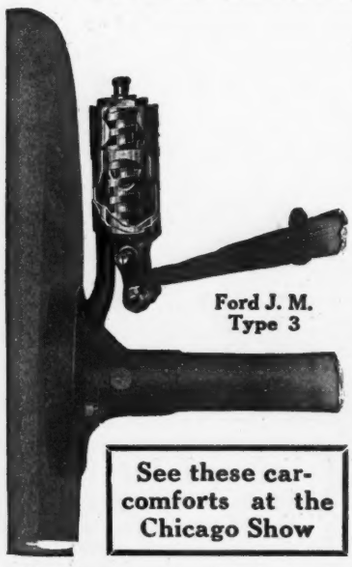


MODEL "A", J. M. SHOCK ABSORBER
Twin Tube Type on ¾ Elliptic Springs

In the U. S. Circuit Court of Appeals for the Seventh District, Judges Baker, Seaman and Kohlsaat sitting, a decision favorable to the J. M. Shock Absorber Co. has just been handed down. The final paragraphs of this decision read:

"Whatever Tilt is entitled to must be found in the device of his patent, specifically. His bottom plate and its four rigid rods, together with his specific arrangement of his sleeves and blocks, are essential elements of his claim. Appellants do not use those features and therefore do not infringe.

"The decree of the District Court is reversed, with direction to that court to dismiss the bill for want of equity."



Ford J. M. Type 3

See these car-comforts at the Chicago Show

This leaves us free to follow our original policy of concentrating our best efforts on furnishing the car-owning public with shock absorbers which give the best of service.

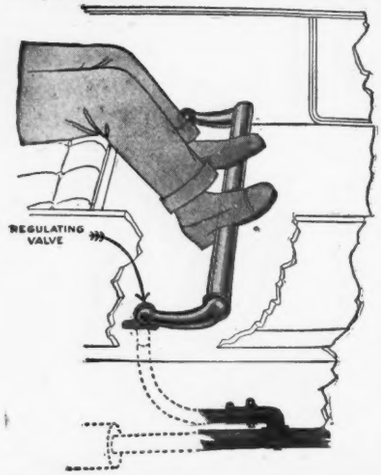
Our desire to see the J. M. on every good car is no stronger than our desire to have the J. M. give satisfaction to every owner. Put your shock absorber problems up to us—we are at your service.

THE J. M. SHOCK ABSORBER CO., Inc.

Main Office and American Factory
210 S. 17th St., Philadelphia

Factory Branch
250 W. 54th St., New York

Branches in every leading City—write for list



K. P. FOOT REST HEATER

sets the waste heat from your engine to work, warming the atmosphere within the tonneau.

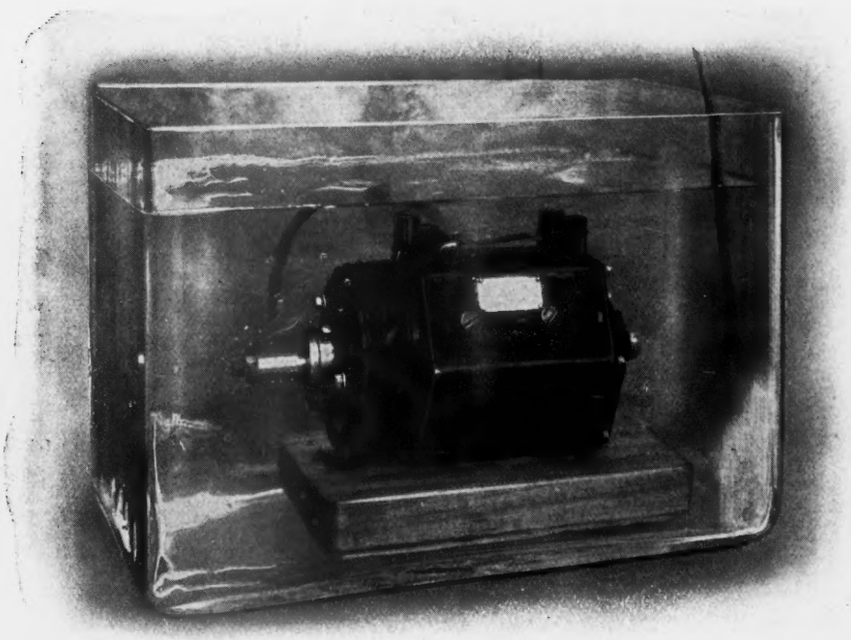
Odorless, noiseless, expenseless in operation. A more handsome ornament to any car than the ordinary foot rest which it replaces. Regulating valves keep temperature perfectly under control of passenger. Furnished in length to fit any car—oxidized, nickel-plated or brass finish—at $25 (f. o. b. New York) including all parts for attachment.

THE K. P. FOOT REST HEATER COMPANY
250 West 54th St., New York
Sold by every J. M. Shock Absorber distributor

Dyneto

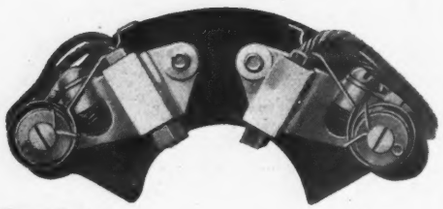
REGISTERED TRADE MARK

SINGLE UNIT ELECTRIC STARTING & LIGHTING SYSTEM



After Running 8 Weeks Under Water

The DYNETO Single Unit Motor-Generator showed maximum efficiency for Starting and Lighting work. The electrical windings in the DYNETO are of such quality and so treated by our special process that they are absolutely oil and water proof—no short circuits.



Brush Holder Assembly

Granting that you fully appreciate the value of a single unit electric starting and lighting system that always can be depended upon to furnish ample power for both starting and lighting—that positively and automatically prevents you from ever stalling your motor—that is small and compact, so much so that it weighs only 45 pounds—

This is the plus value

Granting that you are cognizant of the advantage of having such a personification of efficiency and dependability as a part of your motor car, think now of this further all-important feature.

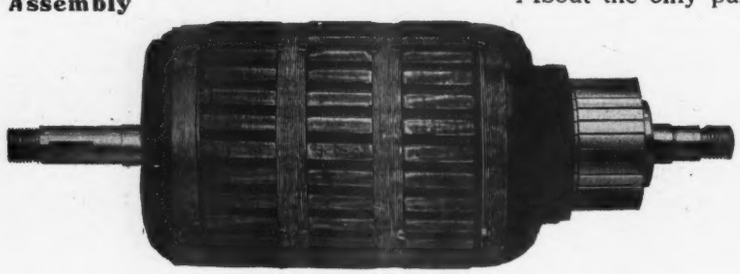
The Dyneto single unit electric starting and lighting system will more than likely outlast any car upon which it is installed.

Because of the unique design which provides for the elimination of all complications and wearing parts, such as cut-outs, relays, solenoids, clutches, gears, etc.—because of the use of only the very finest and most expensive materials in its construction—because of the utmost care in the machining and manufacturing of each and every part that goes to make up the finished unit—because of the insistence of this care in manufacture by most exhaustive tests and inspection of each and every operation, singly and in assembly—

Almost nothing to wear

The Dyneto single unit electric starting and lighting system will stand up and perform to its fullest efficiency long after most other parts of the car upon which it is installed have required repair or replacement.

Armature Assembly



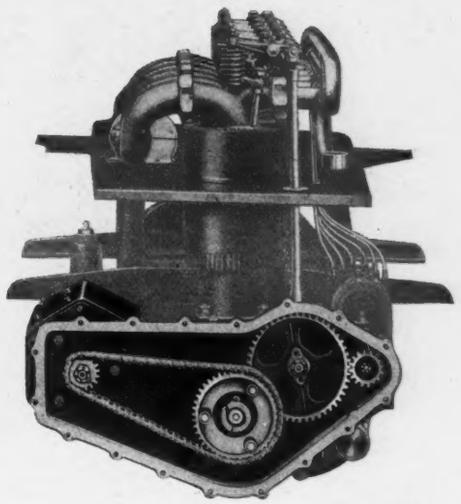
About the only parts of the Dyneto that will show any wear at all are the brushes and we have made any number of tests which indicate that those brushes will stand up for as much as 100,000 miles.

Quality Always Present

Just as prima facie evidence of the truth of these past statements, herewith are a few details.

Wherever it is possible to use stampings instead of cheaper castings, stampings are to be found in the Dyneto. The shaft is made of the finest and most expensive alloy steel specially heat treated, when a cheaper and inferior substitute might easily be used without detection till months after the system had been sold. The commutator segments not only are of special design to prevent wear, but they are made under a special process to insure hardness. In addition to this the copper used is the purest and highest grade obtainable. Dyneto brushes not only cost more as bought by us in bulk, but each brush is carefully examined and tested before it is assembled. And to insure full efficiency out of this exceptionally high value material the tools and dies with which these materials are machined are specially designed and specially produced.

Basic Design Unique

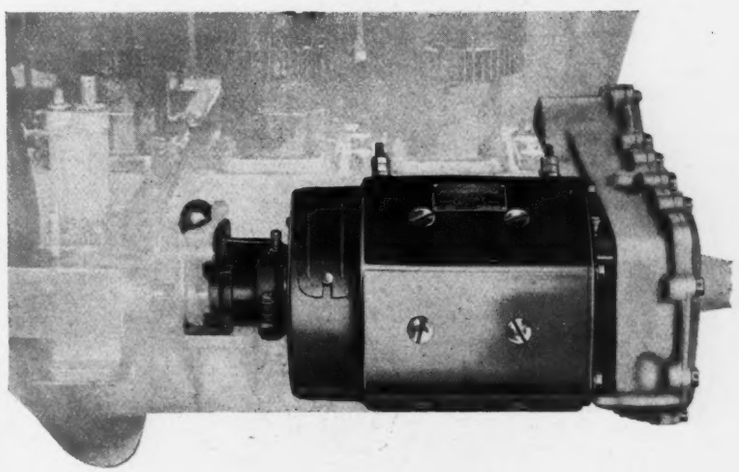


Franklin Application —End View

And with this supremacy of design, materials, and construction which assures maximum efficiency, maximum dependability, maximum durability, the Dyneto is comparatively lower in price than most other starting and lighting systems on the market.

This condition is the result of our design purely.

The trouble breeding complications of all other systems not only emphasize the superiority of the Dyneto, but by their costliness they place the cost of the other systems comparatively above the cost of the Dyneto.



Franklin Application —Side View

Dyneto

REGISTERED TRADE MARK

THE COLD WEATHER TEST

Following are the results of a recent test made with the Dyneto coupled to a four-cylinder motor $3\frac{3}{4}$x$5\frac{1}{2}$, with approximately 75 pounds compression.

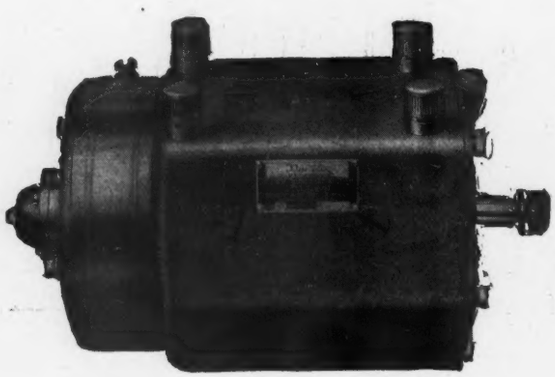
The motor was placed over night in a cold storage plant and the tests were made at varying temperatures from $7\frac{1}{2}°$ below zero to 28° above zero. Perfect starts ad lib. resulted without a single failure during a long period of time—until the witnesses were tired of watching.

Then after purposely discharging the battery completely and allowing only 40 seconds for recuperation, the Dyneto gave 22 consecutive starts at 10 seconds intervals.

This simply emphasizes further our claims of supremacy in general and the specific facts that as a motor the Dyneto is naturally more powerful than the smaller motor in a two unit system; while as a generator the Dyneto is far more efficient than the smaller generator of a two unit system; and yet its weight is much less than the combined two units.

DYNETO ELECTRIC CO., Syracuse, N. Y.

Send us any electric problems you may have



$695.00

112-In. Wheelbase Electrically Started and Lighted

Lightness, with strength and dependability—this is the SPHINX Car, in a few words.

This 112-in. wheelbase car with 4-cylinder monobloc motor, delivering 28 H.P., and with full standard equipment, handsome streamline body of excellent design and finish and easy riding cantilever springs, is pre-eminently the up-to-date light car for the average American family. It represents the point of arrival—the latest and most satisfactory result—in the transition from the big-car type to the popular-price car of full equipment and fine appearance.

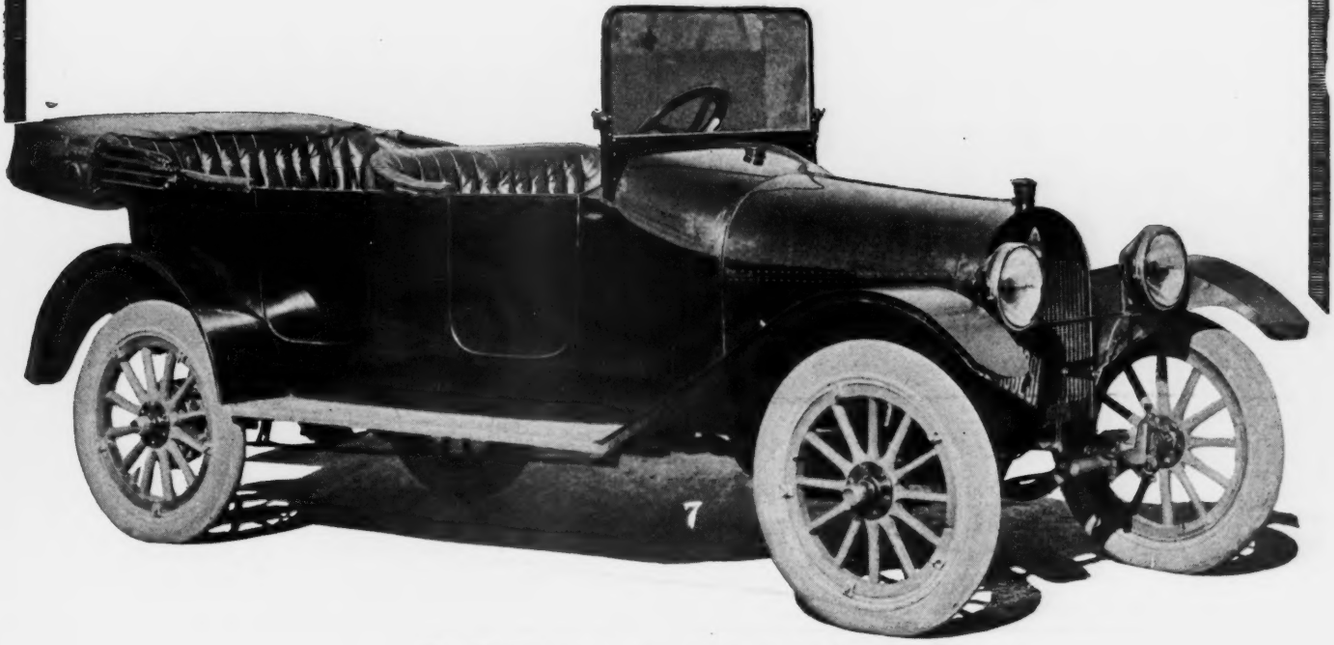
We say most emphatically and without equivocation that the SPHINX Light "Four" is the car with the largest selling possibilities to-day.

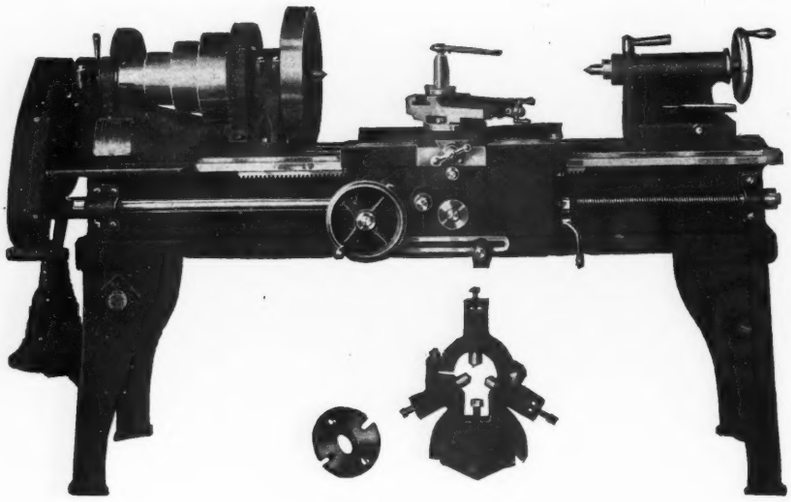
To clinch the matter and make it superlatively attractive to dealers we have a money-making proposition for SPHINX agents, carefully designed to move the cars into the possession of the great waiting public.

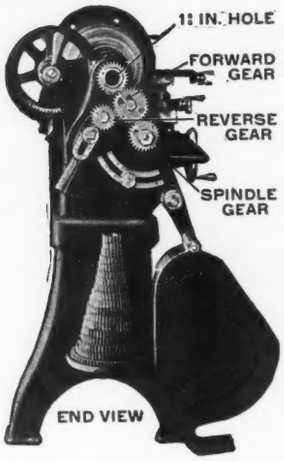
If you wish to embrace the opportunity of seeing this most remarkable car, if you want to secure your district rights, write or telegraph us immediately.

Will be on exhibition at Greer Bldg., Chicago, January 23d to 30th, 1915.

SPHINX MOTOR CAR COMPANY, York, Pa., U. S. A.







TRADE W.F. AND J.C. MARK

3 Machines for the Up-to-Date Garage 3

An 18 inch Lathe ***A 20 inch Drill*** ***A No. 2 Arbor Press***

This new 18 inch Barnes Lathe swings 18″ over bed ways; has 1⅝″ hole in spindle; cuts threads 1 to 56; takes 3″ wide belt on cone; large step of cone 10″ dia.; has automatic cross-feed; 4 changes of feed in apron without changing gear. Workmanship and material of the best. Made in 6 and 8 ft. beds.

The Barnes 20″ Drill is too well known to require any comment. The No. 2 Adjustable Arbor Press is a machine for use in the Garage Repair Shop for pressing shafts into and out of pulleys, gears, hubs, etc., and for straightening automobile axles and frames.

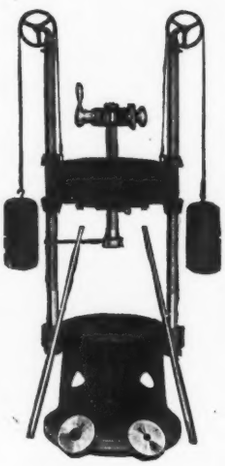
A Lathe
A Drill Press
An Arbor Press

—3—

MADE BY

W. F. and John Barnes Company

444 Ruby Street Rockford, Illinois



As a wide-awake dealer you ought to know more about these cars. Make it a point to see them at the shows.

Herff-Brooks Four = $1100 and Six = = $1375

LOOK over Herff-Brooks cars and, even if you know something about them, your impression will be one of surprise and keen interest.

Here are cars every dealer ought to know more about. They are big, powerful, fine-looking cars, at prices so attractive that in the hands of any active dealer they mean constantly increasing business.

Herff-Brooks specifications are convincing. Study them. Notice how excellent is every detail. Ignition is by the best Bosch system, not the low-priced type.

Bearings are Timken and New Departure, with brass-lined babbitt motor bearings on both sides of each connecting rod.

The electric equipment, the carburetion, the finish, all are very fine.

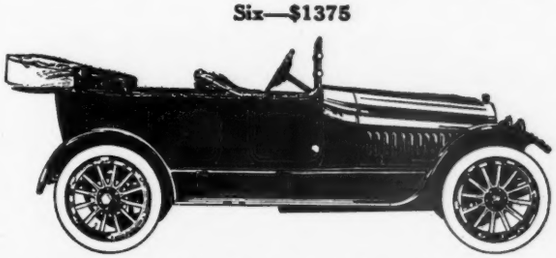
In size and power Herff-Brooks cars are in the "big" class, yet they are economical and efficient.

To you as a dealer this should be an opportunity to get acquainted with new and mighty promising cars. Make it a point to see them; we promise you won't regret it.

Make our booth your headquarters. Have your mail sent in our care at Chicago. Space Q-1, Main floor, Coliseum Annex, Chicago

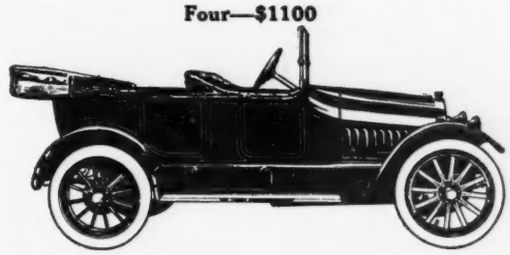
These Specifications Deserve Your Study:

Six—$1375



50 Horsepower Six Cylinders, 4-in. x 4½ in.
Highest Grade Bosch High Tension Magneto DU System
Honeycomb Radiator
Stewart Speedometer
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Timken and New Departure Bearings
Stromberg Carburetor
18-in. Folding Down Steering Wheel
124-in. Wheelbase
Seven Crankshaft Bearings
One Man Top
Turkish Upholstering
Electric Starting & Lighting
Demountable Rims, Extra Rim
Complete Equipment

Four—$1100



40 Horsepower Four Cylinders, 4½-in. x 5-in.
Five Crankshaft Bearings
Drop Down Steering Wheel
One Man Top
118-in. Wheelbase
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Electric Lighting and Starting
Stewart Speedometer
Honeycomb Radiator
Demountable Rims, Extra Rim
Timken and New Departure Bearings
Turkish Upholstery
Stromberg Carburetor
Bosch High Tension Magneto DU System
Complete Equipment

Write for Catalog M. A.

Herff-Brooks Corporation
Indianapolis, Indiana

GIBSON QUALITY

THE STERLING MARK ON MOTOR ACCESSORIES
Gibson Quality

Accessories Shop Equipment Service-Treatment

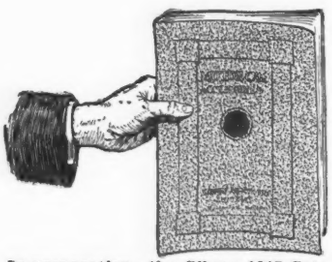
Seven thousand (7,000) progressive dealers in every section of the United States, have found that the

Gibson Quality Name

Whether applied to an Accessory or to the Service and Treatment rendered them by this house—means the best it is possible to obtain.

Fifteen Years

Experience in the Accessory field, at YOUR service. This guarantees you a line of selected articles that have proven value. It places at your disposal the largest and most complete stock of Motor Car Accessories and Shop Equipment in the world. You are insured instantaneous shipment on every requirement.



In preparation—the Gibson 1915 Catalog. The authority on Automobile Accessories. A complete Dictionary of Supplies and Shop Equipment. It is for the Dealer ONLY. Ready for distribution early in 1915. Edition is limited—get your request in early.

We have a high grade tire proposition to offer live dealers—the FALCON TIRES AND TUBES—the final word in tire and tube construction.

Write for this agency—it means big profits to you.

THE GIBSON COMPANY

320 North Capitol Boulevard **Indianapolis**

"The MENOMINEE" TRUCKS
FOR ECONOMY

$1800 Chassis Only

$1950 Complete With Body

MODEL C—1½-TON TRUCK
With Express or Stake Body

Are You a Dealer?

—in automobiles, in the same town with merchants, butchers, dairymen, expressmen, transfer men, brewers, wholesale manufacturers—who are eternally wishing they could give better service at comparatively less expense?

—And have you ever talked motor truck to them?

Yes, or no—call now and close their order for as many MENOMINEE TRUCKS as they need—in the exact type and price that will fit their business.

Note the Following Sizes and Prices

Model A-3—1,500-pound capacity Chassis, $1,125; complete with Express or Stake Body, $1,200.

Model B-3—2,000-pound capacity Chassis, $1,400; complete with Express or Stake Body, $1,500.

Model C—3,000-pound capacity Chassis, $1,800; complete with Express or Stake Body, $1,950.

This assortment of sizes makes "The Menominee" Fit Any Business

It helps big business men save money—with trucks that work fast, economically, and all the time.

So, **Dealer** and **Business Man**, look for each other, and some mutual, profitable business, with MENOMINEE TRUCKS.

We have something good for you both. Mail attached coupon today and let us explain.

D. F. Poyer Company
Menominee, Michigan

(COUPON)

D. F. POYER CO., Menominee, Mich.
Gentlemen: I am interested in "THE MENOMINEE" Motor Truck. Kindly send me complete information.

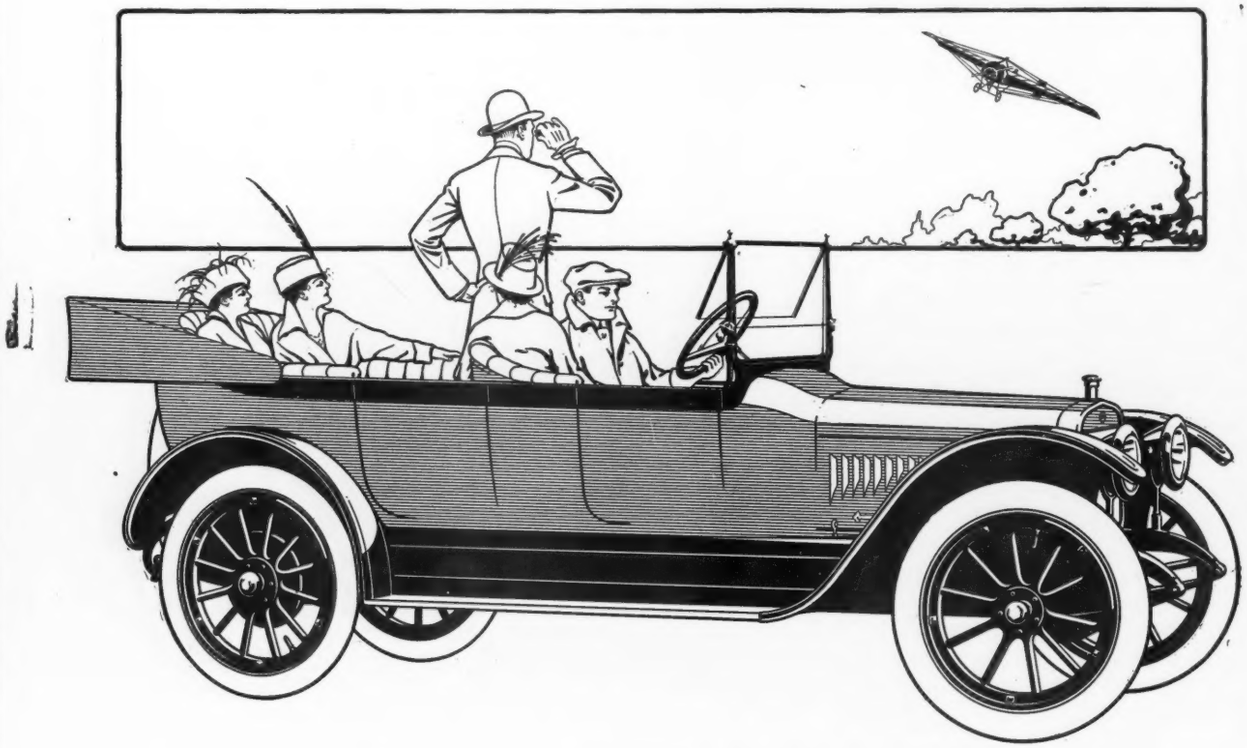
Name .....

Address .....

If a dealer check here. ☐

See the New-Size $2285

WINTON SIX



Your Own PERSONAL Car

AUTOMOBILE buyers have long complained that they could not obtain genuine quality in any but the biggest and costliest cars. When they wanted cars of medium size, they were forced to accept medium quality. So we have brought out the high-grade New-Size Winton Six, with 3⅝ by 5¼ six-cylinder motor and 128 inch wheel base.

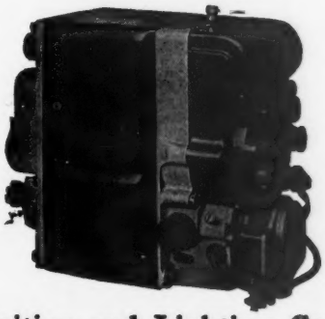
This car fills a place never before occupied. Supplies a want never before satisfied. Highest of quality in every feature, and at a price hitherto impossible—$2285. And, best of all, we finish your personal car in a color scheme of your own selection, making it distinctly **your own** personal possession, not merely an anonymous vehicle.

WRITE TODAY FOR COMPLETE CATALOG

The Winton Motor Car Co., 424 Berea Road, Cleveland, Ohio

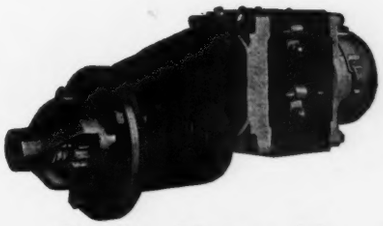
Westinghouse Electric

Ignition, Lighting and Starting Systems Include Equipment for All Applications



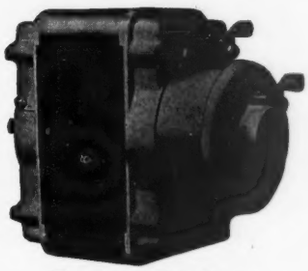
Ignition and Lighting Generator (self-contained with Ignition coil)

And



Starting Motor with Automatic Gear Set

Or



Starter-Lighter

And

Vertical Drive Ignition Unit

39 Makes of Cars Use Westinghouse Equipments

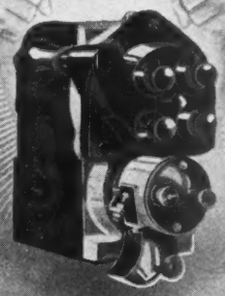
Westinghouse Electric & Manufacturing Co.

Automobile Equipment Department

East Pittsburgh, Pennsylvania

SPLITDORF

MODEL EU4-2
HIGH TENSION
MAGNETO



DIXIE
TYPE

Largest MAGNETO Contract Ever Placed

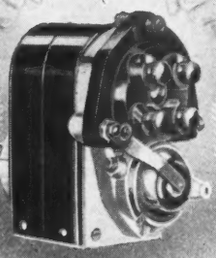
OVERLAND

ignition for 1916 will be exclusively

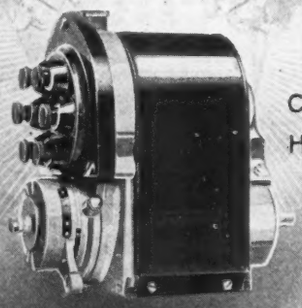
DIXIE

The Willys-Overland Co. has placed the large magneto order ever given for their entire 1916 output

Not battery ignition—not the 19th century magneto, but the 20th century DIXIE



MODEL EU4
HIGH TENSION
MAGNETO



CUNNINGHAM
HIGH TENSION
MAGNETO

SPLITDORF ELECTRICAL COMPANY
NEWARK, NEW JERSEY

IN OUR recent letters to dealers we called to their attention the rapid-fire changes that are taking place in the industry. We emphasized the importance of factory and dealer connections based on experience, brains *and* financial strength.

In stating at that time that the Cole Motor Car Company was in position to meet the present situation with a car and a proposition in keeping with the times, we had in mind this wonderful Cole Eight on which the best eight cylinder brains in the industry have been working for more than a year.

This car is now *Ready* in every sense of the word.

$1785

Standardized

It is a Standardized Eight — containing every one of the Standard Cole units.

It is the product of more than a year's exhaustive research and development on the part of the best eight-cylinder engineering brains in the industry.

Weighs less than 3500 pounds with 126-inch wheel base and 35 x 4½ tires; has roomy comfort for seven people.

Northway unit power plant with 3½ x 4½ bore and stroke, 346.4 cylinder displacement, all moving shafts enclosed.

A distinctly foreign type of full-flowing body design, with divided front seats, disappearing auxiliary seats, and beautifully rounded one-man top of pleasing design. Turkish upholstering of long-grained, hand buffed, genuine leather.

The very latest simplified Delco starting, ignition and lighting equipment built into the motor— *now* absolutely standard.

Latest type accessible Timken axle with extra large, noiseless helical bevel gears and powerful, quiet brakes. Extra large driving shafts and bearings.

Eight Cylinder

$1785

Detroit Steel Products self-lubricating springs in connection with the Cole new straight drive suspension, makes it hold the road quietly and comfortably.

The above Cole units are the product of America's greatest motor car specialists—the BEST. All the Engineering Boards of these specialists, with their immense factory organizations of world renown, have united with the Cole Board of Engineers to produce the Cole Eight. This combination of industrial and engineering brains has established a standard of dependability which insures deliveries, and, after all, Mr. Dealer, you make money only *on the cars you deliver.* **We guarantee delivery dates on the Cole Eight.**

TABLE OF MECHANICAL DATA

MOTOR—Northway, eight cylinder, 3½" bore x 4½" stroke, cylinders cast en bloc in fours—three-point suspension. All moving shafts enclosed. Clean cut and accessible to a startling degree. Lubrication: Splash and force feed system.

ELECTRICAL—Delco's latest improved starting, lighting and ignition.

BRAKES—Positive Timken external contracting; interior expanding.

FUEL SYSTEM—Stewart vacuum gasoline feed.

AXLES—Latest Timken, front and rear. Largest size helical gears. Timken bearings throughout.

CONTROL—Gemmer, irreversible left drive, center control.

SPRINGS—Detroit Steel Products Company's latest direct drive suspension, self lubricating.

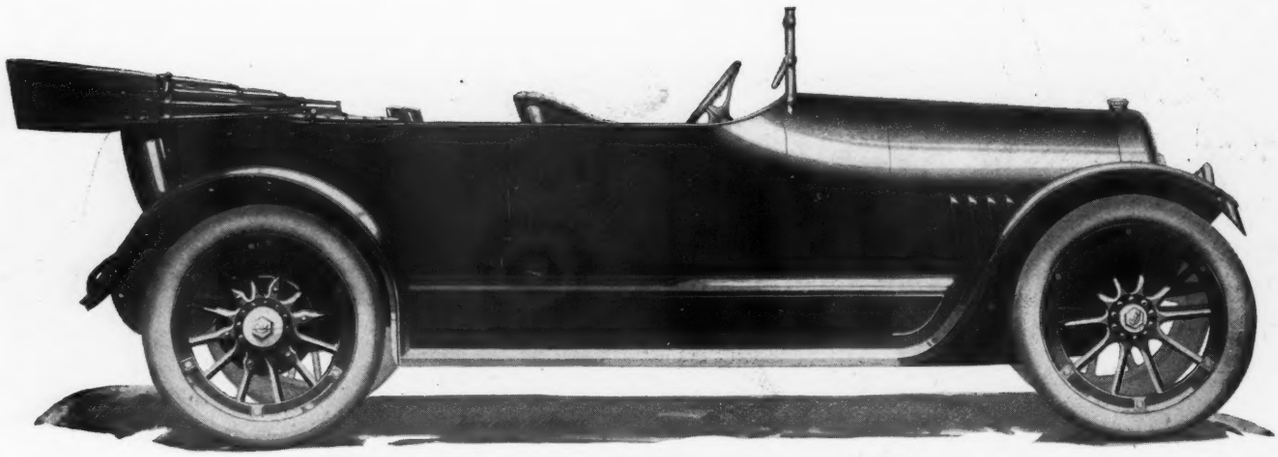
TRANSMISSION—Selective, three speeds forward and reverse.

WHEEL BASE—126 inches.

RIMS—Firestone demountable.

EQUIPMENT—Fully equipped, including motor driven tire pump and gauge; genuine one man top with inside adjustable curtains; service lamp; oil sight feed; electric horn, etc.

Cole Motor Car Company : Indianapolis, USA



Cole Standard Four and Six

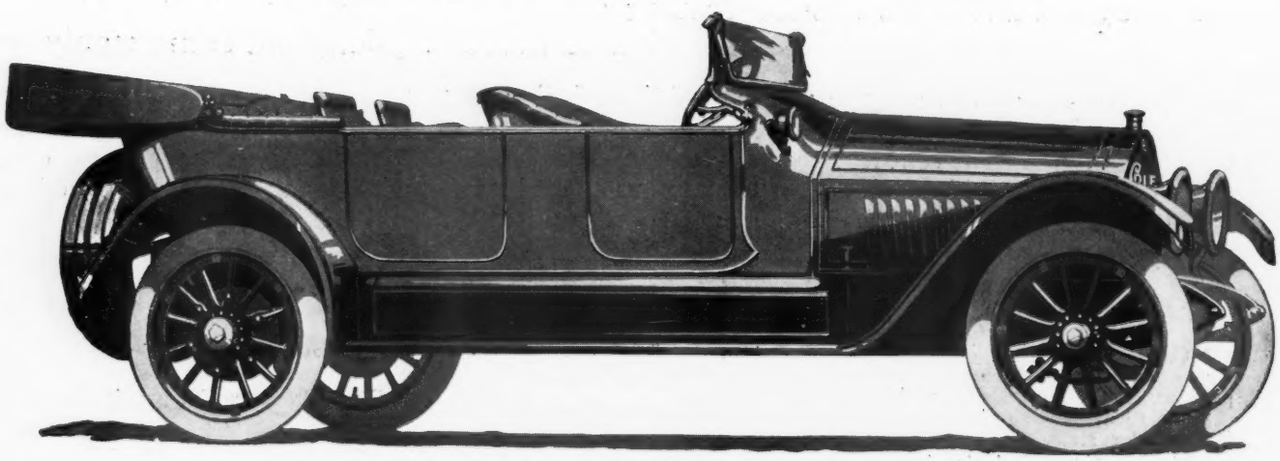
THE motor car has developed to a point where there is now a car for every purse—a design for every taste. Cole Motor Cars are designed and priced for the average man of affairs. They combine luxury and elegance with thrift and economy.

Cole models come in Fours, Sixes and Eights, ranging in price from $1485 to $2465 in touring car and roadster models. The prices on all these models are indicated below.

The Standard Four and Six are seven-passenger cars with two distinct improvements — the divided front seat and the one-man top.

The Cole Big Six and the Sensible-Six, both seven-passenger cars, round out the Cole line. Each offers every refinement and luxury, and is complete in every detail. The Big Six is all that its name implies, a transcontinental touring model big in room and comfort. The Sensible-Six is a companion car to the Big Six, only lighter and somewhat smaller.

Model 850—Standard Eight	**$1,785**
Model 440—Standard Four	**1,485**
Model 651—Standard Six	**1,685**
Model 650—Sensible-Six	**1,865**
Model 660—Big Six	**2,465**



COLE BIG SIX AND SENSIBLE-SIX

COLE MOTOR CAR CO.
INDIANAPOLIS, U.S.A.
BUILDERS OF THE STANDARDIZED CAR

Living it over Again

In a mental picture, he reviews the accident—the result of his recklessness.

He realizes too late that it is *always foolhardy* to motor on slippery roads and streets without equipping *all four tires* with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Strange, is it not, that *some men laugh at peril*—they do not seek to avoid danger—and they have no fear because they have no prudence.

They continue to motor over sleety, icy, or wet roads and pavements with "Foolish Dependence Upon Bare Rubber Alone" until a false turn—a sudden meeting at a corner—a slip or a skid—*brings disaster as the punishment for their imprudence.*

You motorists with reasoning brains put on your Tire Chains at the first indication of slippery streets, and the editors of the daily newspapers are urging *all* motorists to *follow your example.*

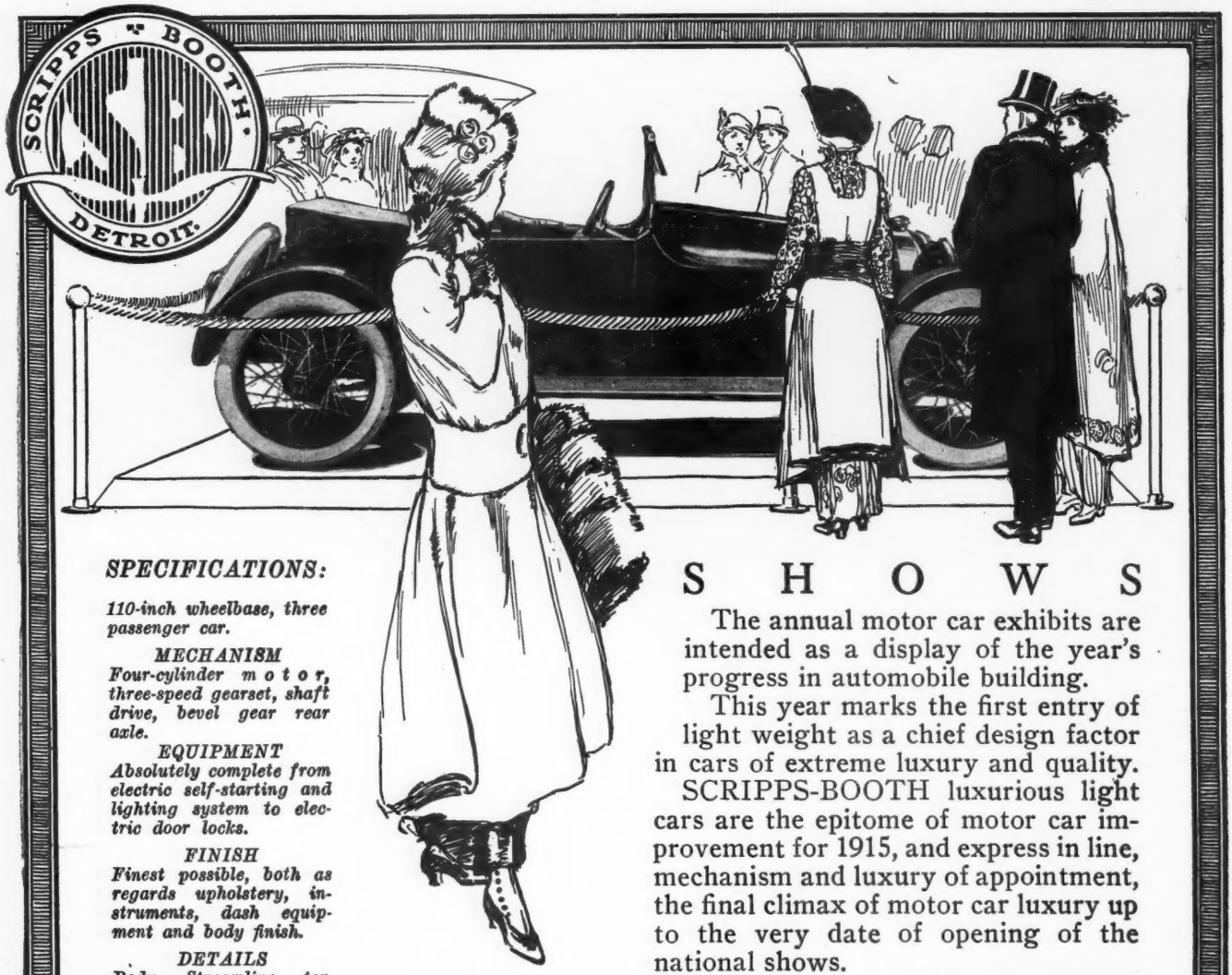
For instance, **the Public Ledger of Philadelphia, Pa., published by the owners of The Saturday Evening Post, in an editorial on August 1st, 1914, said that the simple adjuration to *"Use Tire Chains on wet and slippery pavements"* deserved to find its way into a law, and that law should by all means be enforced.**

Promote "Safety First" in YOUR motoring circle—insist that everyone use Weed Chains on ALL tires.

Weed Chain Tire Grip Co., Bridgeport, Conn.

Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.



SHOWS

The annual motor car exhibits are intended as a display of the year's progress in automobile building.

This year marks the first entry of light weight as a chief design factor in cars of extreme luxury and quality.

SCRIPPS-BOOTH luxurious light cars are the epitome of motor car improvement for 1915, and express in line, mechanism and luxury of appointment, the final climax of motor car luxury up to the very date of opening of the national shows.

The display of SCRIPPS-BOOTH cars at New York and Chicago will set a better standard of luxurious motor car building than has heretofore been seen in any automobile exhibition in America.

SPECIFICATIONS:

110-inch wheelbase, three passenger car.

MECHANISM

Four-cylinder motor, three-speed gearset, shaft drive, bevel gear rear axle.

EQUIPMENT

Absolutely complete from electric self-starting and lighting system to electric door locks.

FINISH

Finest possible, both as regards upholstery, instruments, dash equipment and body finish.

DETAILS

Body — Streamline, torpedo stern, highest grade blue-black finish, domed fenders. Upholstery, finest quality long-grain buffed leather. Cowl dash instruments; sight feed oiler, lighting and dimming switches, starting strangler, starting and ignition switch, flush type speedometer, generator indicator, shroud light and foot space light.

WHEELS

Five Houk, triple-laced detachable wire, 30x3½ inches, wide hubs.

AXLE

Rear, full-floating, annular bearings throughout. Bevel drive. Ball bearing universal joints on the Kardan shaft. All gears and shafts 3½% nickel steel. Drive shaft tubular.

MOTOR

Sterling, valve-in-head type, high speed, gearset in unit, pump feed oiling with sight feed on dash, 2⅞ bore, 4-inch stroke, four-cylinder, water cooled. Develops 18 horsepower. Fitted with Zenith carburetor and Atwater-Kent automatic spark advance, connected with starter generator system.

STARTING

Bijur single unit electric, connected by silent chain, operated by locking dash switch.

SPECIFICATIONS:

SPRINGS

Front, semi-elliptic with over-slung frame. Rear, floating cantilever.

EQUIPMENT

Silk mohair top with side curtains, rain vision plate glass windshield, electric door lock, Klaxet horn, full tool equipment, jack. Luggage space at the rear large enough for two suitcases and tools. Spare Houk wheel, tire and tube on all cars.

FEATURES

Klaxet button in center of steering wheel cannot be operated when ignition switch is off, eliminating miscellaneous horn blowing while the car is standing.
No projecting handles or slots in the doors. Electric door locks are operated by pressing a small push button.

SCRIPPS-BOOTH COMPANY, DETROIT, MICH.

List of
Auto Manufacturers Using "Jiffy" Curtains

Abbott-Detroit
Columbia-Knight
Chandler Six
Dodge Brothers
FIAT
Franklin
Grant
Hupmobile
Howard-Six
Hudson
Inter-State
Keeton
Knox
Krit
Lewis
Lexington
Locomobile
Lozier
Luverne
Mitchell
Monarch
National
Oldsmobile
Packard
Paige
Peerless
Pierce-Arrow
Pilot
Pope-Hartford
Regal
R-C-H
Studebaker
Stevens-Duryea
White
Willys-Knight
Winton

"Jiffy"—the one curtain that meets every requirement

"Jiffy" curtains are distinctively in harmony with the type of motor car progress that reveals its sound merchandising sense by giving the utmost in motor car *value*. Read that again! Then note the "Jiffyquipt" cars at the Chicago Show.

There is a wide diversity of opinion on many points of design and equipment. And with good reason.

But there is a remarkable *unanimity* of opinion on the subject of top curtains. The "Jiffy" has the call.

And the "Jiffy" deserves this unfaltering preference because it is the *one* curtain that meets every requirement.

It is simple. It is convenient. It is easily stored away and just as easily brought into action.

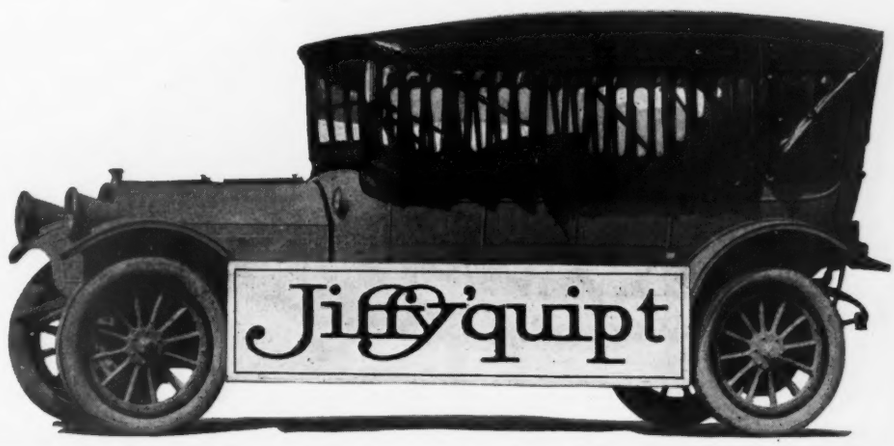
"Jiffy" curtains fold without cracking or rolling the celluloid lights—and they slide into position in a "jiffy"—just as simple as opening and closing a door.

They are out of the way in raising and lowering the top—and yet there they are—ready for immediate use.

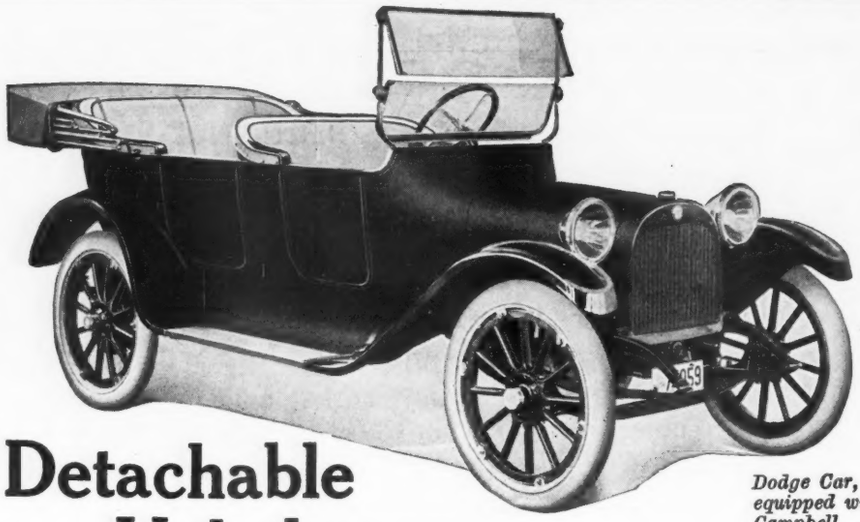
Just look at the list of makers who use "Jiffy" curtains. What sold these people? It wasn't *price*, for "Jiffy" curtains cost more. It was, and is, *quality*. Everything that *is* found or can be expressed by that word "quality" is found in "Jiffy" curtains.

Some people like to fool around with a substitute. Others go straight to the *real thing* and share its advantage. Have *you* the latest "Jiffy" facts?

Jiffy Auto Curtain Co., Detroit, Mich.



CAMPBELL GUARANTEED MOTOR CAR ACCESSORIES



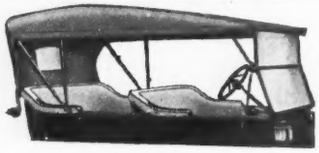
Dodge Car, equipped with Campbell Detachable Upholstery

Detachable Upholstery

Better Than Seat Covers

Campbell offers the trade and the car owner a bold innovation in automobile accessories, Detachable Upholstery that has all the advantages of the old style seat cover with the added richness and beautiful fit of the finest plain upholstery on the highest priced cars.

Campbell Detachable Upholstery is the last word in motor luxury. Rare fabrics and colors that harmonize with every color scheme, faultless fit and wonderful durability characterize this new product of the famous house of Campbell.



Although but a few weeks old, this latest accessory has already become a remarkable factor in the motor world. Its quick detachable feature and its ease of cleaning make it a most attractive proposition to the trade and the car owner. Many fabrics, colors and prices in stock sizes to fit all popular makes and models of cars.

One-Man-One-Hand Top —for light cars. A real one-man top that a child can operate. Up or down in ten seconds. Genuine mohair, finest trimmings, best quality throughout. Ten second curtains and dust hood included. An excellent selling proposition.

PERCAMA, The Heavy Fabric Cleaner Cleans tops, upholstery, rugs, mats—all heavy fabrics that water will not injure. Safe, sure. Contains no explosive, will not injure rubber or waterproofing materials. Inexpensive to buy. Economical to use.
Quart, 25c; ½ gal., 40c; gal., 60c.

Write for Catalog

Showing our complete line, including the livest Ford Specialties on the market, auto straps of all kinds, robes, tourists' sleeping blankets, and dozens of other accessories. Write to

THE PERKINS-CAMPBELL CO.
624 Broadway, Cincinnati, Ohio

Dealers!

We have the fairest agency plan you ever read. Get in touch with us. Address all trade correspondence to the Sales Manager.

See the New KisselKar Models at the Chicago Show

36-Four $1450

42-Six $1650

48-Six $2350

60-Six $3150

Your choice will be a KisselKar

WHEN you buy a car you are going to decide on the one that comes nearest to **your** ideal, regardless of what salesmen say.

It has got to square with **your** sense of beauty, **your** standard of comfort, **your** conception of mechanical merit.

All the 1915 models are now lined up for inspection—**which will be yours?**

Take a good look at these new KisselKars—the 36-Four, the 42-Six, the 48-Six and the 60-Six. You will agree that **no cars in sight are more striking,** none handsomer or so distinctly individual.

And you will further agree that for responsiveness, flexibility and quiet operation, a **Kissel motor is supreme.** You will love to drive it—and so will **she.**

Convenience of appointments, accessibility of chassis parts, completeness of equipment—these are other **KisselKar characteristics that will demand your admiration** and shape your verdict of approval.

These cars—if you like—are ALL-YEAR cars. *The Detachable Sedan Top* with the two-door touring body gives the service of two cars for but a trifle more than the price of one. You will thoroughly appreciate this feature when you see how well the combination looks—and how easy it is to make the changes.

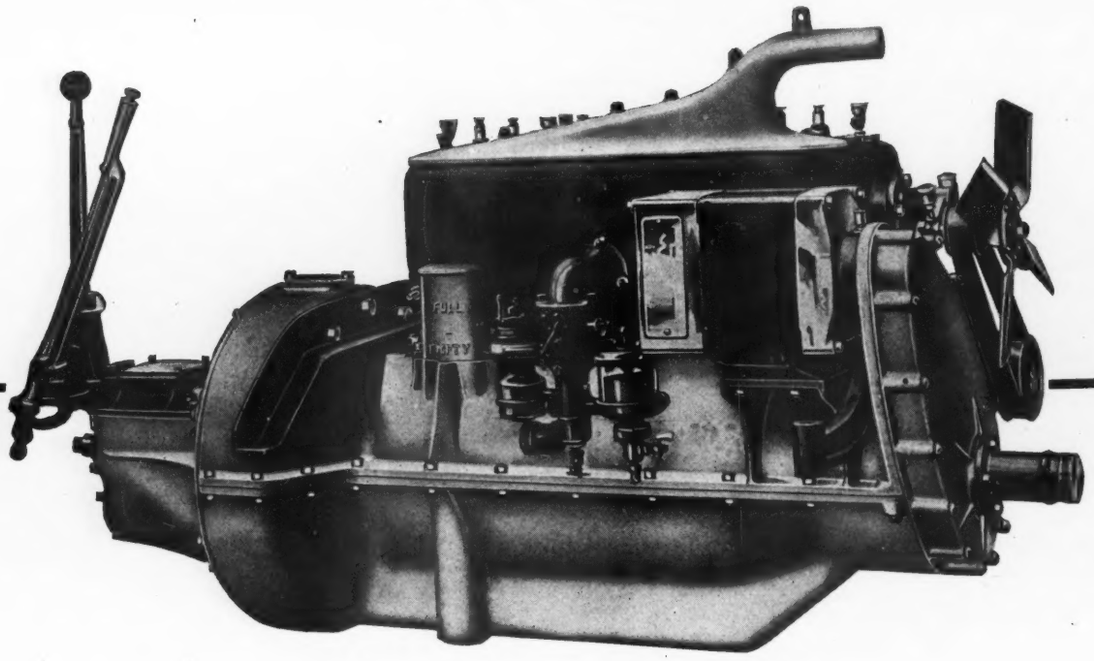
If by chance you have missed seeing the new KisselKars, do so at once. You can't help saying they are the best values on the market.

KISSELKAR

Every Inch a Car

Kissel Motor Car Co., 121 Kissel Avenue, Hartford, Wis.

New York, Boston, Chicago, Philadelphia, St. Louis, Milwaukee, Minneapolis, St. Paul, Dallas, San Francisco, Los Angeles, Oakland, Omaha, Cleveland, Detroit, Toledo, Columbus, Buffalo, Rochester, Baltimore, Pittsburgh, Duluth, Seattle, New Orleans, Nashville, Hartford, Conn.; New Haven, Troy, Norfolk, Providence, Marhalltown, Ia.; Madison, Montreal, Toronto, Calgary, Victoria, and 300 other principal points in the United States and Canada.



It's a Model—

Model motors are designed upon the fundamental principle of MINIMUM WEIGHT, then there is added those elements essential to a good motor—strength, endurance, silence and power.

Our factory facilities are unexcelled.

Our workmen are efficient. The use of a Model motor will convince you.

DESCRIPTIVE LITERATURE SENT ON REQUEST

TWO NEW SIZES—2¾" x 4½"—"4," and 3" x 5"—"6"

Pittsburgh Model Engine Company

Lexington Street and Pennsylvania Railroad **Pittsburgh, Pa.**

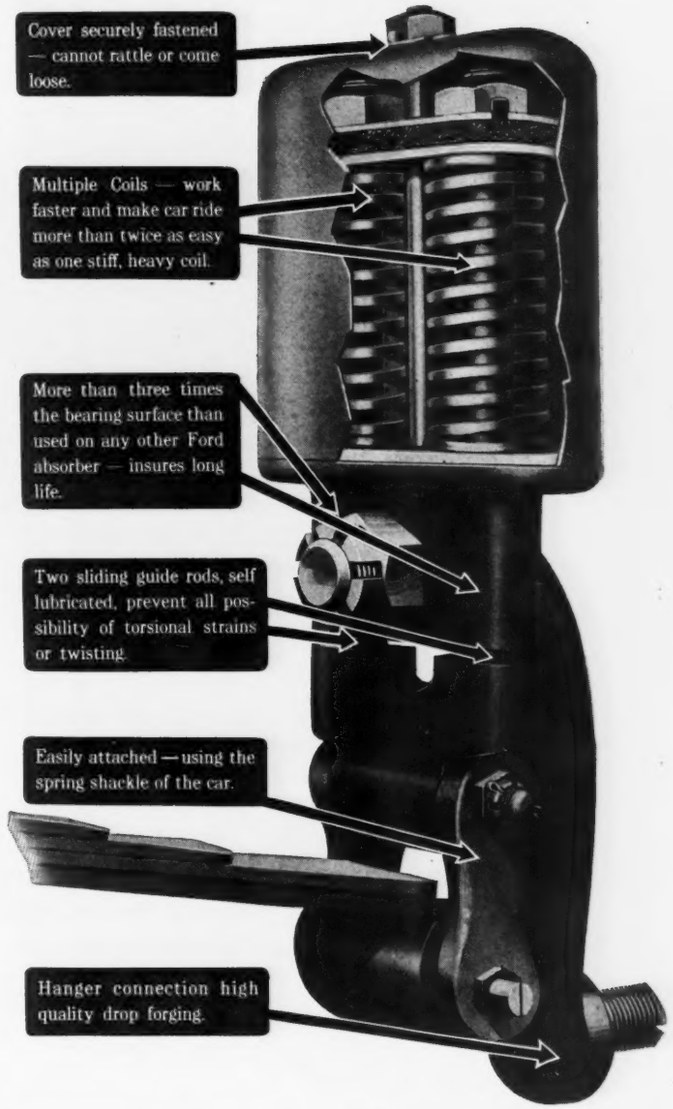
FACTORIES—Pittsburgh, Pa., and Peru, Ind.

This is the most important Shock Absorber announcement ever made to FORD OWNERS.

It tells how and why the oldest shock absorber manufacturer—the only company in America that makes nothing else but Shock Absorbers—finally placed on the market the

Velvet Shock Absorber *for* Fords

SET of FOUR $15


Cover securely fastened — cannot rattle or come loose.
Multiple Coils — work faster and make car ride more than twice as easy as one stiff, heavy coil.
More than three times the bearing surface than used on any other Ford absorber — insures long life.
Two sliding guide rods, self lubricated, prevent all possibility of torsional strains or twisting.
Easily attached — using the spring shackle of the car.
Hanger connection high quality drop forging.

Velvet first REAL absorber for Fords

We have spent over a year in perfecting the Velvet Shock Absorber for the Ford car. And we have been making nothing but Velvet Shock Absorbers since 1909. The objectionable features of the cheap Ford absorbers are all eliminated and the Velvet Ford is as mechanically correct in construction as our older, successful types of shock absorbers used on the best known cars.

Saves its cost in three months

The Velvet Ford Absorber saves its cost in tire expense alone. Rim cutting is unknown with Velvet equipped Fords, because tires can be fully inflated without discomfort to passengers. Tires wear longer because of better spring suspension. And repair expense is less because road shocks are taken by the absorbers instead of by the mechanism of the car.

The ONLY Multiple Coil Absorber Made

A set of Velvet Ford Absorbers has eight flexible, quick-acting, resilient springs that softly cushion every shock. You wont find this construction in any other absorber. This means 90 coils of spring as against 40 to 44 in other makes.

Same principle, same efficiency, same construction as used on high price cars

The $15.00 Ford Velvet Absorber is of high grade construction, has the same careful workmanship, and works on exactly the same principle as the more expensive types of absorbers we sell for high price cars. Absolutely no side sway possible with velvets.

Don't experiment with so-called "cheap" absorbers

Because there are a large number of Ford cars in use, a number of shock absorbers have been made to sell at what seem to be low prices. We give you our word that the margin of profit on the Velvet is infinitely less than on any of these "cheap" absorbers in spite of the fact that we are the largest and only exclusive maker of absorbers in America.

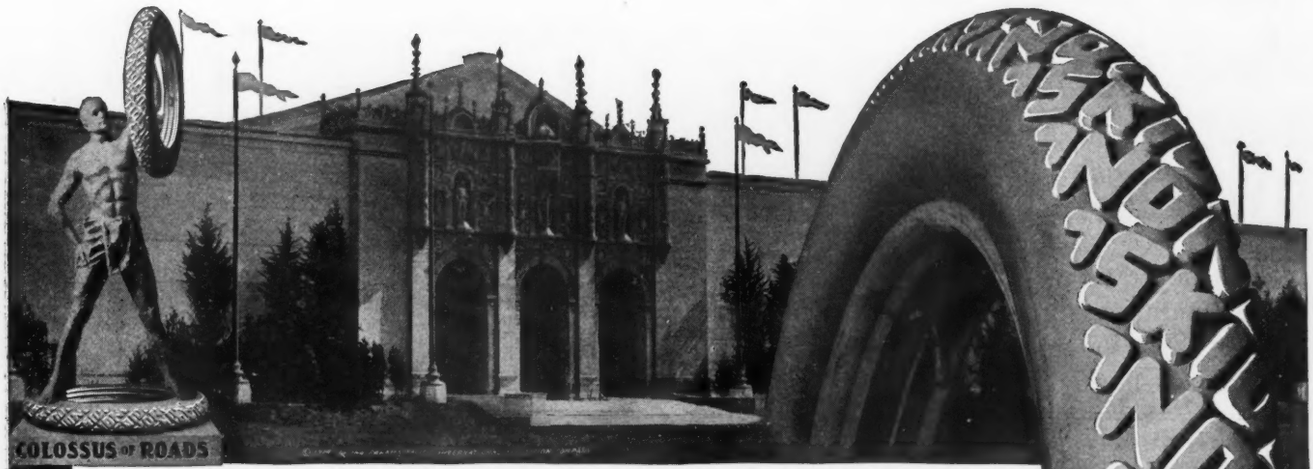
The Velvet Shock Absorber is the biggest money maker ever offered to dealers because *it lasts and gives absolute satisfaction.*

We have an exclusive agency proposition and free trial offer you ought to know about at once. Write us for particulars. You know the success we have made with Velvets on big cars, so get in line on the Ford proposition. It's the biggest winner yet.

The John W. Blackledge Manufacturing Company

Shock Absorbers Exclusively

Dept. B, 2110 So. Michigan Ave., Chicago



Transportation Building Panama-Pacific International Exposition, San Francisco

An "Exposition" of Tire Values

FIRESTONE—the tire of Most Miles per Dollar—is an acknowledged leading factor in this modern miracle of transportation.

Car owners everywhere recognize the Firestone achievement in every practical demand of safety, economy and comfort. They enjoy a daily "Exposition" of travel-insurance in the Non-Skid Tread, an all-sufficient protection in any road or weather.

The powerful Firestone body affords the necessary base for the massive Non-Skid tread. When thousands of miles have worn off the lettered tread, this body is extra mileage dependence.

Finally add the value in expert, specialized production, with price no higher than the average, and you have an "Exposition" of the Firestone reasons for

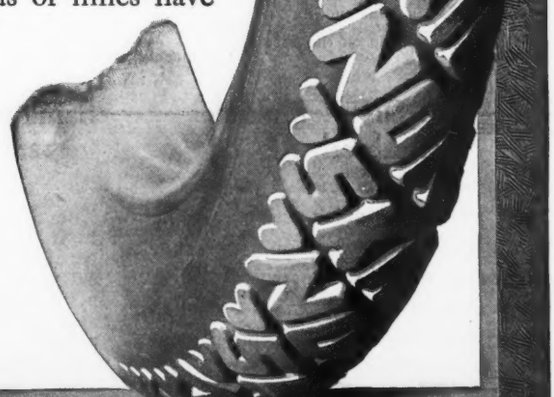
"Most Miles per Dollar"

The Nearest Dealer Will Supply You with Firestones

FIRESTONE TIRE AND RUBBER COMPANY

"America's Largest Exclusive Tire and Rim Makers"

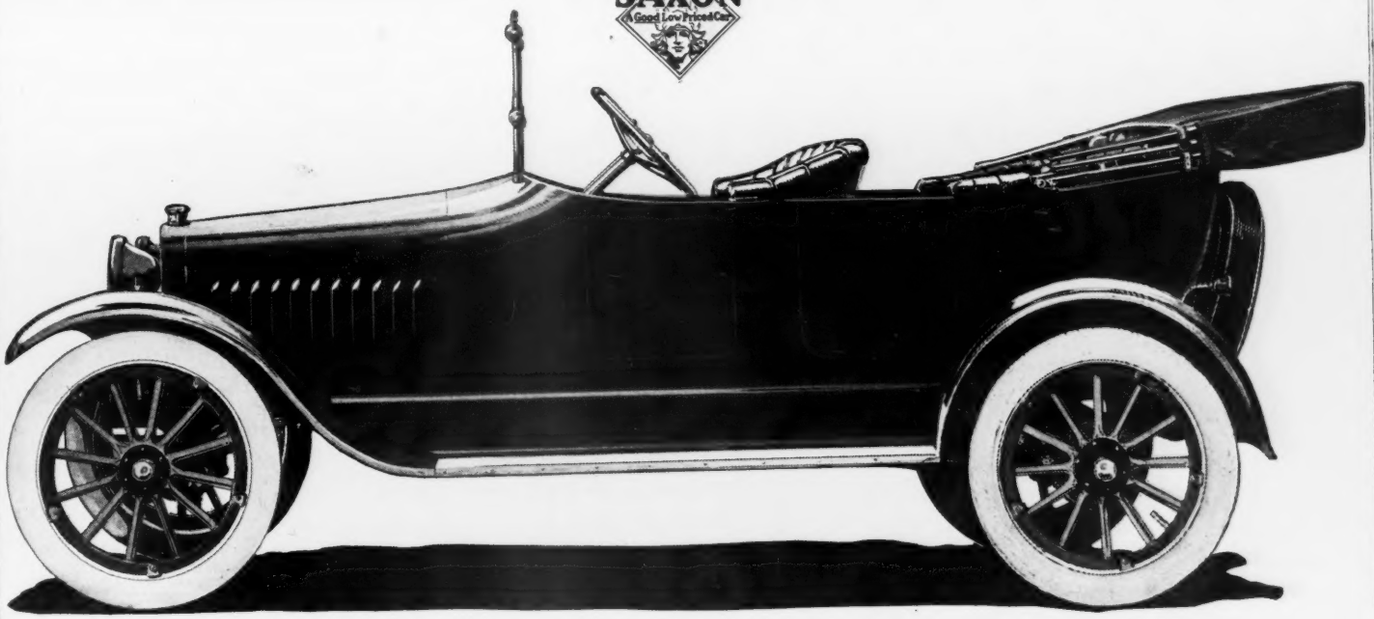
Akron, Ohio—Branches and Dealers Everywhere



Firestone NON-SKID TIRES

SAXON

A Good Low Priced Car



SAXON SIX $785

On the Main Floor at the Coliseum This Year

A year ago the Saxon Company at the time of the Chicago automobile show held a private exhibit of Saxon cars. Being a new company, we were not entitled to space at the show itself. This year we are again exhibiting Saxon cars in Chicago. But this year we are showing these cars in the Coliseum—*on the main floor.* Not the second floor, the basement, the Annex, or in the Armory—but on the main floor of the main building.

The reason why we are showing Saxon cars on the main floor of the main building is because our volume of business entitles us to that honor. The Saxon Company shipped more cars in its first year than any other company ever shipped in its first year in the whole history of the automobile business.

Record for 2-Passenger Saxon

And the reason why we surpassed the record of any other company in its first year is because we offered good, sturdy, roomy cars at a popular price. The record of Saxon cars in performance is quite as remarkable as the record in sales and shipments. Saxon cars everywhere have stood up under all sorts of conditions. They have made good. They have proved their economy time and time again.

Today the Saxon roadster at $395 is still the lowest priced real two-passenger car on the market. From the start it has been a wonderful value for the price. With its new body, and other refinements—in looks, in comfort, in mechanism—it makes a stronger appeal than ever before.

Saxon "Six" a Surprise

Riding with the two-passenger Saxon on this wave of popularity is the Saxon "Six" a big, roomy 5-passenger car, completely equipped including Gray & Davis electric starting and lighting system. This car has a powerful, high speed motor developing 30-35 horse power; three forward speed transmission; 32 x 3 1-2 inch tires; demountable rims; 112-inch wheelbase and a host of other features unlooked for in a "six" at this price.

There is a mighty big present and a still bigger future before the Saxon, because both the Saxon "Six" and the Saxon roadster provide absolutely the best values in the world at anywhere near their prices For this year the output of the improved two-passenger Saxon will be doubled. We have ample finances, an efficient organization, and a new factory which will produce 25,000 cars for this year. Our dealer's offer is unusually attractive. Write today and get it.

(From N Y Tribune Jan. 5)

Generous Dimensions a Feature of "Saxon Six"

Although Extremely Low Priced, It Shows No Skimping in Finish or Equipment

"The car that surprised me more than anything else that I saw was the 6-cylinder Saxon," said a prominent dealer at the show yesterday "Not only is it remarkable that a 'six' can be built and sold at so low a price, but just as unusual is the fact that this same car has so much room and such generous dimensions throughout.

"Of course, like so many others, I knew before seeing the new model that it had 112-inch wheelbase; and a wheelbase of that length for any car at this price is uncommon. However, I had not expected to find in the Saxon 'six' such liberal dimensions from the standpoint of roominess and mechanical specifications.

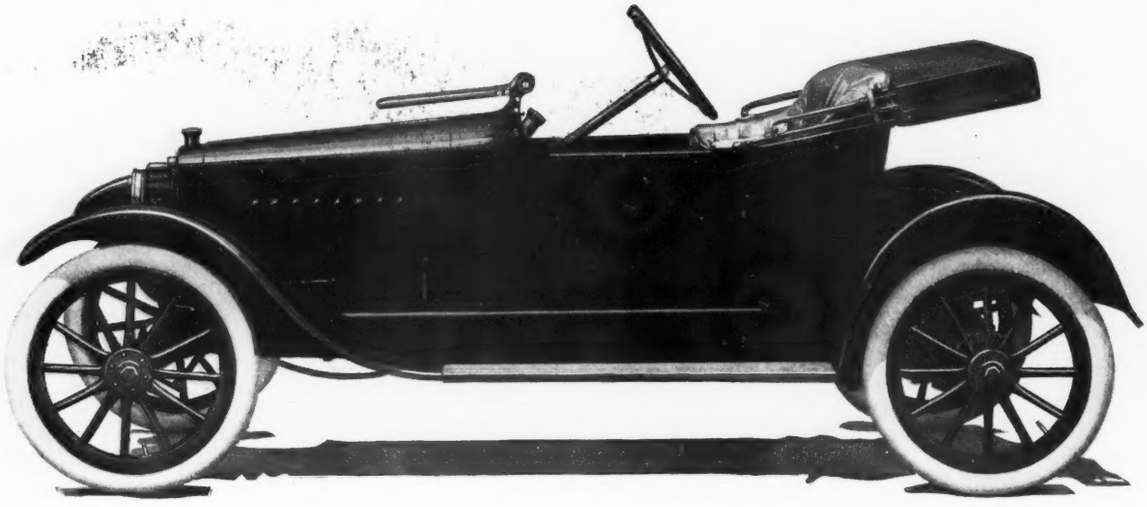
"Without knowing, any one would naturally expect to find a 6-cylinder car at this price skimped in several or more particulars. In all my years of experience as a dealer, I must say that we've got to take our hats off to the Saxon company for knowing how to put big value in low-priced cars.

"This new car does not suffer in any detail by comparison with other cars selling at much higher prices. It is as modern a car as any on the market. Its materials are of high grade. and every feature of its equipment is of first quality."

Saxon Motor Company, Detroit

SAXON
A Good Low Priced Car

SAXON ROADSTER $395



Why This Will Be a Big Saxon Year

THE record at the New York Show of the new Saxon 5-passenger "Six," and the Saxon two-passenger car with its latest refinements has been very gratifying to us.

We had expected the new Saxon models to score—and score big. For we know we are offering wonderful value at low prices. But we had hardly hoped that these cars would receive such immediate recognition from everybody as they were given at the show.

The best way, we believe, to tell you just what measure of success the Saxon got in New York is to give you plain facts, and to let these facts tell their own story.

Public Flocks to Saxon Booth

Right from the start the Saxon booth was crowded continually. Public interest was at a high pitch. And it never let down for a minute. Actual sales, both retail and wholesale, were far in excess of what we had hoped for.

Saxon history was repeated among dealers, too. The Saxon booth proved a magnet for them. Their verdict was that the 1915 Saxon cars, filling as they do the greatest possible demand, will sell themselves. These men tell us that nothing can stop the Saxon this year.

Engineers and sales experts of other companies in and out of the Saxon price class visited the Saxon booth in large numbers. They inspected the new Saxon cars carefully, critically. All endorsed the Saxon; all agreed upon its goodness; all called it a wonderful value at the price.

"Great Value," Says Everybody

From every angle—by every method of judging—the Saxon "Six" and the Saxon Roadster scored a pronounced success. They passed muster before a critical buying public; before leading dealers throughout the east and south; before engineering and sales experts whose names are a byword in the automobile businesss.

This record can only mean one thing; and that is that this is going to be a big Saxon year. Every indication points that way. The Saxon cars offer big value at popular prices. For that reason they appeal alike to the buying public and to dealers. Write and get our offer to dealers in territory now open.

(From N. Y. Journal, Jan. 7)

OUTPUT OF $395 SAXON TO BE DOUBLED FOR 1915

The appearance of the new Saxon six cylinder car at the show has made the Saxon Motor Company's plans with reference to the $395 two-passenger model a matter of considerable interest.

Announcement is made by Lawrence Moore, sales director of the Saxon Company, that the demand for the roadster model compels a doubling of the factory output for this season.

Adequate plans have been made to effect this production, the Saxon Company having recently moved into a factory that gives tripled facilities for manufacture. In its new plant the Saxon Company plans a total output for 1915 of 25,000 cars, including both the 2-passenger 4-cylinder model and the 5-passenger 6-cylinder car

"Although we worked at top speed from the time the first Saxon roadster came out, we have been unable to catch up with the demand," says Mr. Moore. "Thus the only wise thing to do was to arrange for larger output. Inasmuch as this was impossible with the factory facilities we had at the time it was necessary to move into larger quarters.

"We attribute the demand for these roadsters to the fact that they have stood up under all kinds of service, and have proved to be the most economical cars on the market, in addition to being the lowest priced automobile of standard design and specifications."

Saxon Motor Company, Detroit

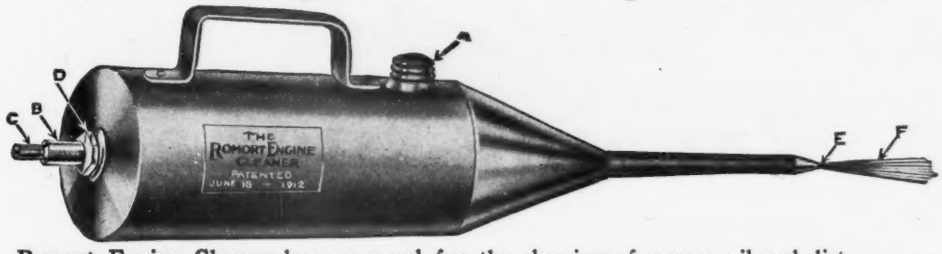
THE ROMORT MFG. COMPANY

Seattle, Wash.

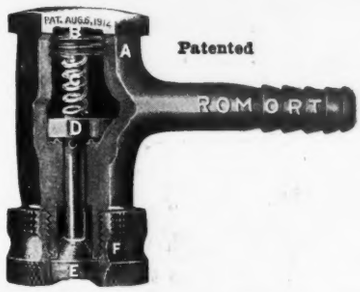
CHICAGO: 1322-1326 Michigan Avenue,

ROMORT SPECIALTIES

Romort Specialties are listed in 80% of the Jobbing Catalogs in the U. S. Ask for the Original Romort. Accept no Substitutes.



Romort Engine Cleaner has no equal for the cleaning of grease, oil and dirt from machinery of automobiles and motorcycles. Price, each..... **$3.00**

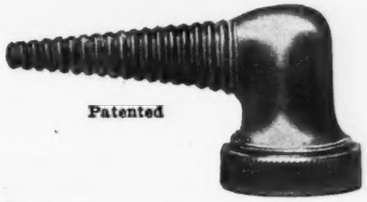


Romort Automatic Air Valve — Style A. The Old Reliable, Guaranteed, Patented, Indestructible. Price, each **$3.00**

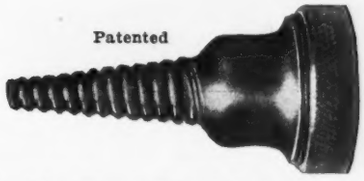
Romort Automatic Air Valve—Style B. Fewer Parts, Light, Durable, Positive in Action. The newest addition to the Romort family. Price each..... **$1.00**

Romort Pump Connection Rubbers. Hold firm against high or low air pressure. Highest grade rubber compound. Long wear. Price, per carton..... **25c**

Fits All Connections



Romort Angle Pump Connection. One piece, with center pin. Made of heavy bronze. Not automatic. Price, each **40c**



Romort Straight Pump Connection. Convenient, Handy, Easy to Connect. Price, each..... **25c**

Romort Air Nozzle. A perfect and effective air cleaner for cushions, tops, foot mats, etc. To be used in connection with Romort Automatic Air Valves and Pump Connections. Price, each..... **25c**

All Romort Valves are made of solid Bronze, not ordinary stampings; cannot rust, are indestructible, will last a lifetime.

Romort Pump Connection Rubbers are genuine only when the name "Romort" appears thereon. Romort Specialties are patented. Accept no Substitutes.

MR. JOBBER: Are the electros for your catalog up to date?

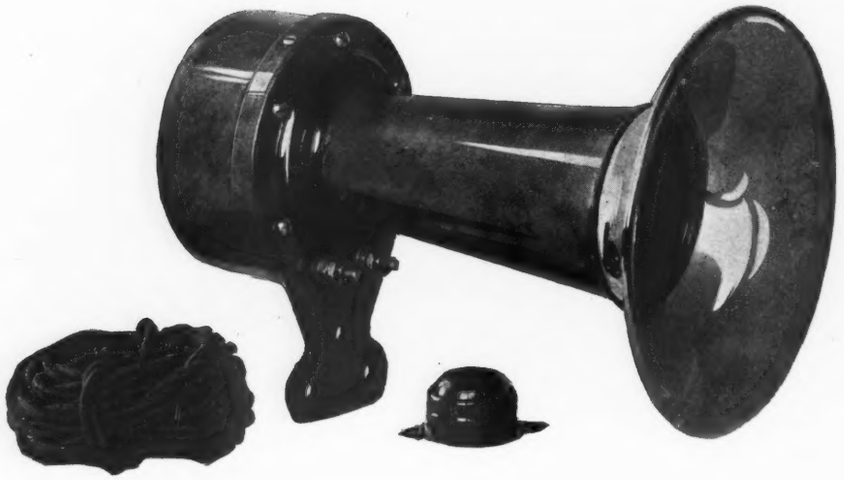
GENERAL SALES DEPARTMENT

THE ZINKE COMPANY, 1322-26 Michigan Ave., Chicago

"GARFORD"

Electric Motor

Warning Signal



This new, improved, electric warning signal is simple and easy to operate. Pressure at any point of the special new push button insures quick and certain contact, and relieves unnecessary groping for a central point button.

The GARFORD Electric Warning Signal may be operated on dry cells or storage battery.

This GARFORD Electric Warning Signal is absolutely guaranteed. Price, complete, $8. Our GARFORD Hand Operated Signal at $4.25 is another very popular model.

Ask your dealer to show you his line of GARFORD Warning Signals, or write us direct.

"Garford" Automobile Warning Signals are now part of the equipment of 300,000 cars.

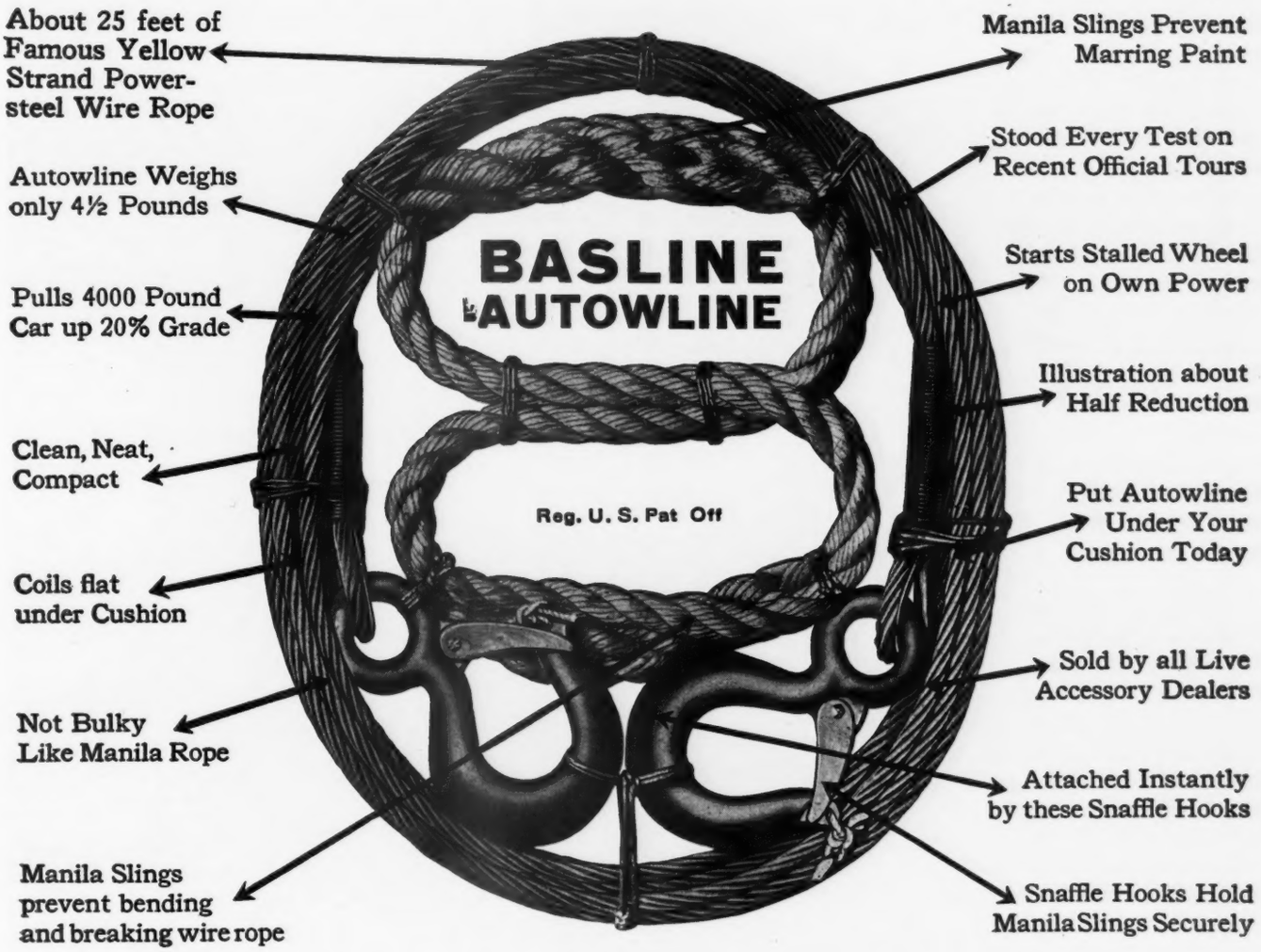
DEALERS—There is no electric horn, at any price, superior to the GARFORD Electric Signal. At $8 it has no equal. GARFORD sales pay dealers. Write for details today.

THE GARFORD MANUFACTURING COMPANY

2503 Olive St., Elyria, Ohio

BRANCH—The Garford Mfg. Co., Kansas City, Mo.
DISTRIBUTORS—The Dean Electric Co., Seattle, Wash.; The Dean Electric Co., Los Angeles, Cal.; Sumter Telephone Supply Co., Sumter, S. C.

$8 $8


About 25 feet of Famous Yellow Strand Powersteel Wire Rope
Autowline Weighs only 4½ Pounds
Pulls 4000 Pound Car up 20% Grade
Clean, Neat, Compact
Coils flat under Cushion
Not Bulky Like Manila Rope
Manila Slings prevent bending and breaking wire rope
Manila Slings Prevent Marring Paint
Stood Every Test on Recent Official Tours
Starts Stalled Wheel on Own Power
Illustration about Half Reduction
Put Autowline Under Your Cushion Today
Sold by all Live Accessory Dealers
Attached Instantly by these Snaffle Hooks
Snaffle Hooks Hold Manila Slings Securely
BASLINE AUTOWLINE
Reg. U. S. Pat Off

If These Arrows Won't Convince You— Basline Autowline Will

AUTOWLINE has convinced hundreds of other careful car-owners that it's as important to their safety and peace of mind as a spare tire. That's why Autowline is always in their cars, winter and summer.

Basline Autowline

will convince you, too, the minute your accessory dealer shows you this wonderful "Little Steel Rope with the Big Pull." Have him show you one this very day!

Buy it for $3.95, east of the Rockies. Then you'll always get a tow home when your engine goes dead, 15 miles from anywhere—and you can help a brother autoist out of the ditch some other time.

Basline Autowline is under the cushions of cars owned by officials, past and present, of the A. A. A.

Powersteel Truckline, a grown-up brother of Basline Autowline, is ideal for heavy towing. Get one for each truck. $6.00 F. O. B. St. Louis.

FREE—Write today for the fully-illustrated Autowline circular

Powersteel Autowlock locks wheel to spring or spare tire to rack. Thieves can't clip Autowlock without shears with 2-foot handles. At your dealer's. Price $2.00.

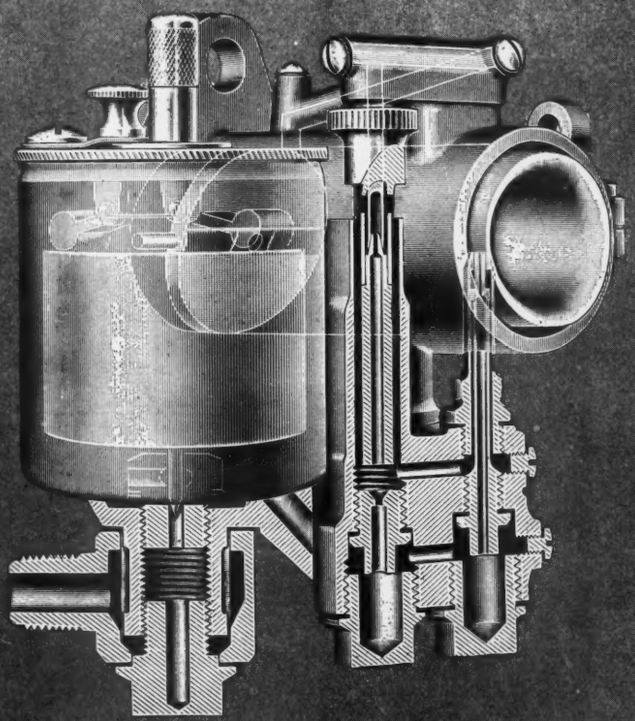
Broderick & Bascom Rope Company

813 N. 2d Street, ST. LOUIS, MO. **New York Office, 76-E Warren Street**

Makers of Celebrated Yellow Strand Powersteel Wire Rope

The Horizontal Zenith

ZENITH
The Carburetor Universal



Attaching directly to the cylinder walls this horizontal type of the famous Zenith eliminates piping and further simplifies carburetor installation. Combine this with the extreme simplicity of the compound nozzle and the limit in precise carburetion has been reached.

SEND FOR THE NEW STORY, "THE COMPOUND NOZZLE EXPLAINED."

Zenith Carburetor Co., Detroit, Michigan, U.S.A.

Save Half Your Tire Expense

Don't neglect the small holes. These little open cuts leave the fabric exposed. Sand and Water work in. Sand pockets develop. The fabric rots. The result—Blow-outs—expensive repairs and usually a ruined tire.

Vulcanize these small holes. Seal them up with new rubber and protect the fabric. You can do it with a Shaler Vulcanizer in a few minutes—make the repair the strongest part of the tire; triple your mileage and save half your repair bills.

SHALER Vulcanizers

Save Tires — Save Repair — Reduce Upkeep

A Shaler Vulcanizer will repair any puncture, blow-out, rip, cut, hole, or tear in casing or tube perfectly and permanently.

Fill the hole with new rubber—clamp on the vulcanizer. Apply the heat, and the repair is completed in a few minutes. It requires no watching or regulating.

No need to worry about overcuring or undercuring because the Shaler has automatic heat control—the only vulcanizer made with this feature.

The Shaler Vulcanizer is the result of years of work to make perfect repairs on pneumatic tires by vulcanization. The Shaler principle is admitted by experienced tire men, garage men and motorists to be thoroughly correct.

The Shaler Vulcanizer is recognized as standard. In the big garages and best repair shops throughout the country Shaler Vulcanizers are in use.

We are the world's largest makers of vulcanizers and make the only complete line.

We make Shaler Vulcanizers in every type—Electric, Steam, Gasoline, and Alcohol. Shaler Vul-Kit (Gasoline) at $3.50—Shaler Tube-Kit $2.00—Model D (operates from Electric light socket) $12.50—Model S (Steam) $12.50, Complete Garage Outfit (Electric or Steam) $60.

Motorists Write for Free Book

"The Care and Repair of Tires"

It is a guide and text book on the care and repair of tires. It tells the proper inflation according to weight, load and season. It describes fully how to protect the tires while car is idle in the garage—how to care for them in winter—how to avoid substances that rot the rubber and fabric. It gives splendid hints on the spare tire and its ca.e—how to carry extra tubes. It explains the tire sleeve, the blow-out patch—repair plasters and plugs and emergency or temporary repairs. This book is quoted as an authority by American and Foreign Automobile Publications, *free* to any motorist. No obligations—just use the coupon here.

C. A. Shaler Co., 203 Fourth St., Waupun, Wis.

Canadian Distributors—John Millen & Son, Limited—Toronto, Winnipeg, Montreal, Vancouver, Victoria

Dealers and Garages

Garages can add to their profits vulcanizing tires. Dealers can double their business selling portable Shaler Vulcanizers to Motorists. Send coupon today for proposition and Dealers' Book, "Common Sense About Tire Repairs."

SHALER Vul-Kit $3.50

Can be carried in the tool box for emergency repairs to tubes and casings. Does away with patches and cement. Absolutely safe. Burns gasoline or alcohol—an exclusive Shaler feature. No watching, no regulating; simply fill the cut or puncture with new rubber, clamp on the vulcanizer—fill and light the generator. You can't overcure or undercure a repair. Handle always cool. Anyone can use it. Complete, $3.50.

Garage or Dealers' Coupon

C. A. Shaler Co.
203 Fourth Street, Waupun, Wis.

Send me catalog, dealers' terms and free book, "Common Sense About Tire Repairs" (for dealers and garages only).

Name.....

Street.....

City..... *State*.....

Do you sell accessories?.....

Have you a repair department?.....

Jobber's Name.....

Motorists' Coupon

C. A. Shaler Co.
203 Fourth Street, Waupun, Wis.

Send me your free book "Care and Repair of Tires" and catalog of Shaler Vulcanizers.

Name.....

Street.....

City.....

State.....

From whom do you buy your Auto Supplies?.....

WHY EXPERIMENT?

CARRY A DEPENDABLE, well known and well advertised line with an established reputation behind them.

J-D SPARK PLUGS are known the world over for their efficiency. Factory equipment on many cars.

J-D PETTICOAT Open End Special Alloy Electrode 75c

Petticoat type spark plugs take their name from the shape of the cylinder end of the porcelain. They are formed with a recess around the central electrode, thus affording extra insulating surface, and decreasing the possibility of short circuiting in sooty or dirty motors.

J-D PETTICOAT Closed End Special Alloy Electrode 75c

This plug is the same as *J-D* Petticoat plug with the exception that it has the closed end shell. It is specially designed for oily and sooty motors.

Factory equipment on Briggs Detroiter and Regal.

J-D CONICAL Open End Special Alloy Electrode 75c

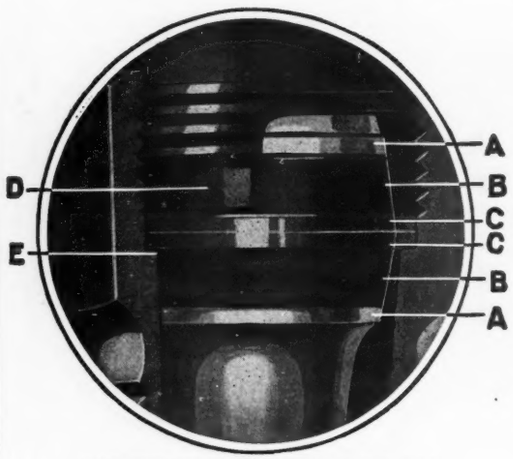
One of the most widely used plugs of the *J-D* brand. It is designed especially to overcome the extreme conditions existing in hot motors.

Factory equipment on Briscoe, Allen, Mitchell and Denby.

J-D PETTICOAT Long Body Special Alloy 75c For Ford Cars

Knife edge contact points avoid sooting up.

COMPRESSION LEAKAGE ENTIRELY ELIMINATED BY SPECIAL J-D GASKET CONSTRUCTION



GASKET CONSTRUCTION ON ALL J-D SPARK PLUGS

ATTENTION is called to the mechanical construction of the packing on J-D Spark Plugs. The Porcelains are formed with a shoulder in the shape of a double cone (A) (A) ground to a true and perfect surface. A packing collar (B) (B) with a flanged end (C) (C) made of special alloy is forced on each one of the cones (A) (A) until the two flanges (C) (C) meet.

The collar (C) (C) supports the Porcelain in the shell and takes all the strain of tightening the bushing. This form of packing affords a ground joint and greatly increases the effective strength of the Porcelain, both through the elimination of any unnecessary strain and through the reinforcement afforded by the extension of the packing collar above and below the points of support in the shell.

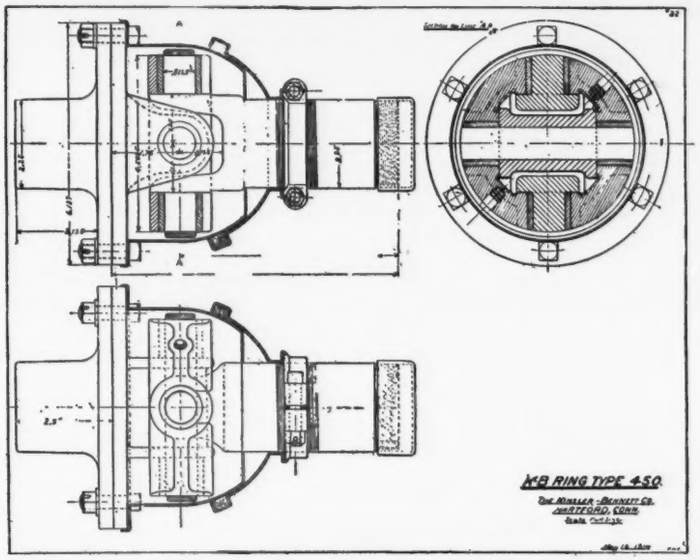
DEALERS—Write at once for special 1915 J-D proposition.

JOBBERS—Your 1915 catalogue will not be complete without J-D Spark Plugs. Write immediately for special catalogue proposition. Electrotypes free upon request.

CHAMPION SPARK PLUG COMPANY, Toledo, Ohio

Formerly manufactured by Jeffery-Dewitt Co., Detroit, Mich.

K-B QUALITY UNIVERSAL JOINTS



WE ARE SPECIALISTS

Our Universal Joints excel in design, material, workmanship and perfection of finish.

K-B Quality Universal Joints

for pleasure or commercial cars are made from finest drop forgings, case hardened throughout. They are for reliable service and are unsurpassed. They are interchangeable with other Universals and may be substituted without any difficulty or bother.

We guarantee deliveries to commence within two or three weeks from receipt of specifications.

American Distributing Co., Detroit, Mich.
Factory Sales Representatives

Kinsler-Bennett Co., Hartford, Conn.

275Y

Snap!

"Snap" is the sound the CONNECTICUT AUTOMATIC SWITCH makes when it "kicks off" the ignition current—automatically—after the motor has been stopped.

"Snap"—is the sound the AUTOMATIC SWITCH invariably makes whenever the driver forgets or neglects to switch off his ignition current—it never fails to work.

With those who know—those who understand ignition—the "snap" of the CONNECTICUT AUTOMATIC SWITCH calls to mind a long list of advantages not possessed by any other system of ignition on the market.

The chief engineer of one of the leading automobile manufacturing concerns readily recognized the advantages of CONNECTICUT AUTOMATIC IGNITION.

With his intimate knowledge of ignition he saw at once that the success of

Connecticut Automatic Ignition

and its superiority over every other ignition system, magneto, battery or otherwise, hinged upon the perfection of the AUTOMATIC SWITCH.

For somewhat over a year he had this system under observation and tests waiting for the switch to fail—but in vain.

The last time he tried it the infallible "snap" of the switch brought forth, "Well, I'll be—[Deleted by the Censor."]

It is needless to say that his cars are now equipped with CONNECTICUT AUTOMATIC IGNITION.

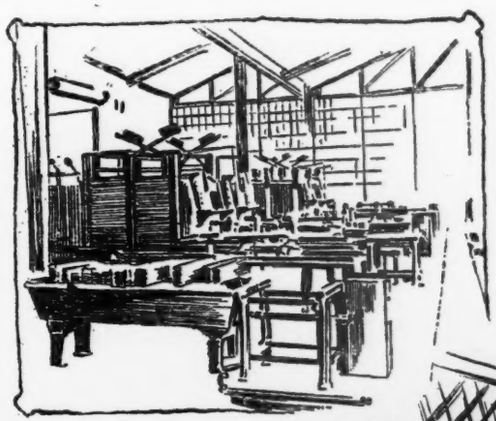
THE CONNECTICUT TELEPHONE & ELECTRIC CO., Inc., Meriden, Conn.

SHELDON

TRADE confidence in a product is the greatest asset any organization can acquire. We have always known this and it is our policy to conserve such an asset. The policy which has been so successful in building up the trade confidence in SHELDON Products as it exists today, will be continued in the future, and with our resources, facilities and organization, we believe that we can not only materially increase the existing prestige of SHELDON Products, but make the name SHELDON a valuable asset to the manufacturer who builds SHELDON Parts into his vehicles and to the dealer who in turn sells the finished vehicles which incorporate one or several of SHELDON Products.

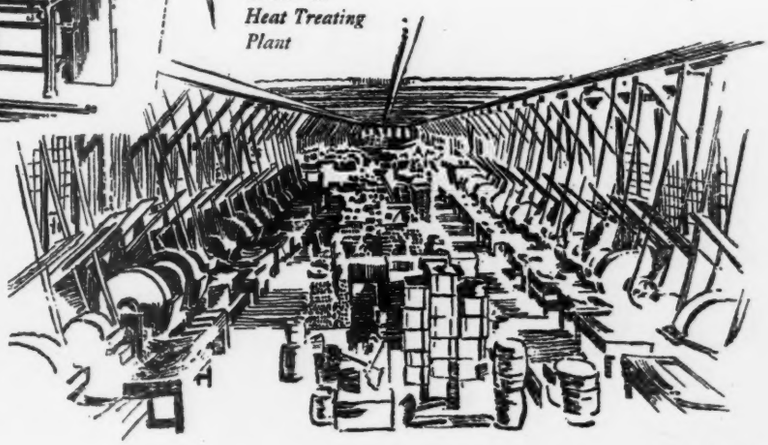
The insurance of quality in SHELDON Products gets its root in the executive branch of our organization.

Ours is essentially the product of engineers and the designing, experimental, manufacturing, testing and selling branches of our business are under the direct supervision of a corps of engineering specialists second to none in the world in their skill, experience and practical comprehension of their respective lines.

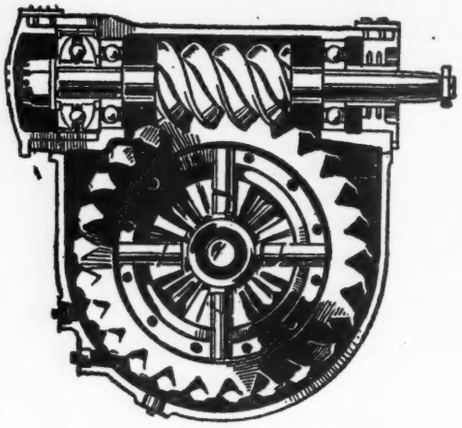


Corner in Heat Treating Plant

The equipment of the SHELDON AXLE AND SPRING COMPANY'S plants is modern to the last detail.

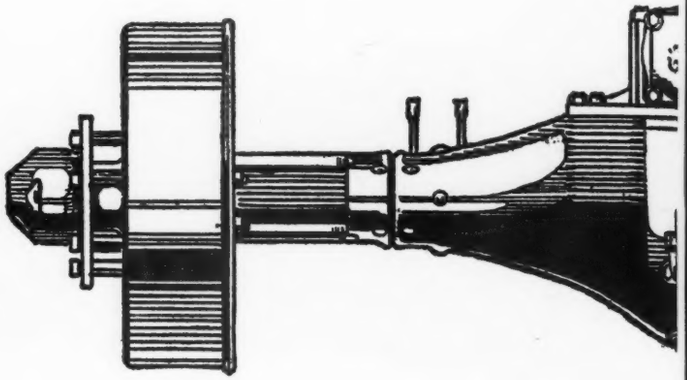


One Section of Spring Grinding Department



SHEL

WORM GE A

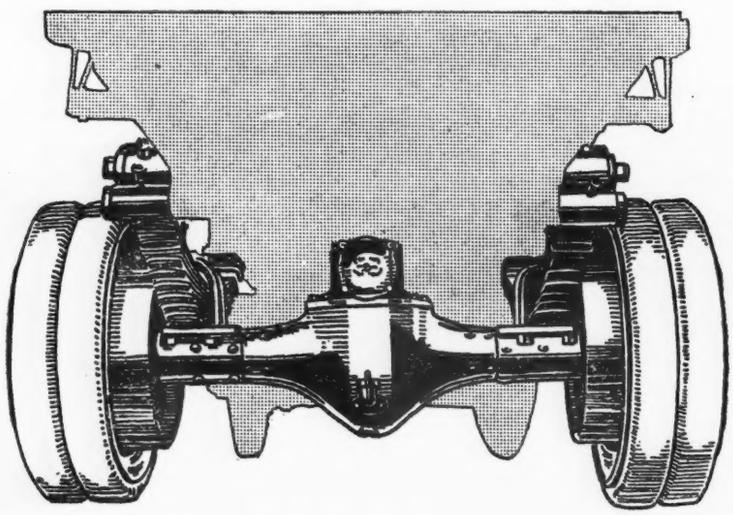


SHELDON'S preference for the worm gear type of axle is based on efficiency of that type of final drive. So thoroughly and so practically have our engineers gone about the design and manufacture of worm gear rear axles that they have produced a type of worm gear drive that transmits to the wheel from 94 to 97% of the power applied.

Efficiency, not manufacturing expediency, dominated our preference for ball bearings to take both radial and thrust loads as they appear in a rear axle.

Our preference for the semi-floating type of axle construction is based upon strength and service alone. We believe, and results have vindicated our judgment, that following the semi-floating principle it is possible to build an axle which makes accessibility an unnecessary factor in the problem.

SHELDON BRAKE AND RADIUS ROD EQUIPMENTS are built to provide the most efficient layout for truck makers who prefer the chain drive to other forms. SHELDON BRAKE AND RADIUS ROD EQUIPMENTS are individual in that they provide for the braking energy to be applied at the rear wheels instead of at the jack shaft. It will be seen readily what an improvement this type of equipment is over the conventional jackshaft brake arrangement.



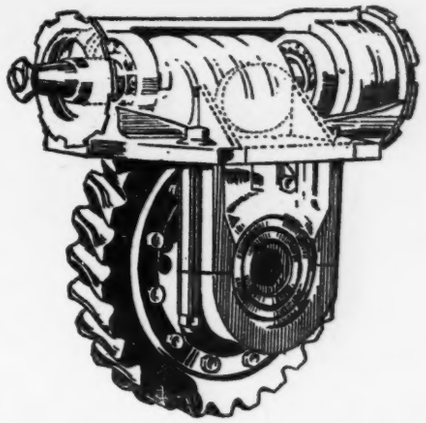
SHELDON TRUCK PARTS are sold only to manufacturers who will agree to use them on trucks with the carrying capacity for which such parts are designed.

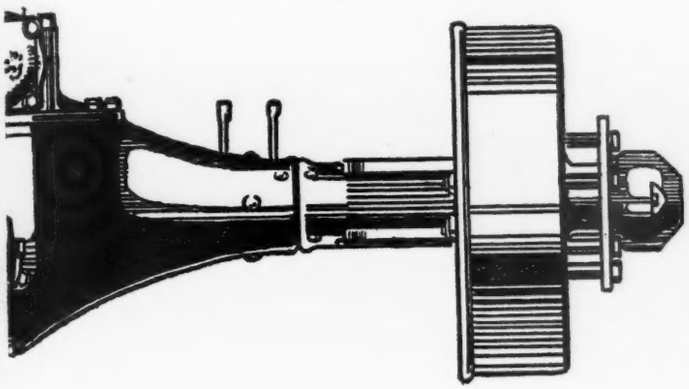
The following clause in our contract and order for automobile axles or other truck parts is a firm foundation upon which the dealer can rely in making statements as to capacity, efficiency and service.

"The buyer agrees to use

,DON

AR AXLES





SHELDON WORM GEAR REAR AXLES are made in all sizes for pleasure cars, and commercial vehicles ranging in capacity from 1500 lbs. upwards of five tons.

SHELDON FRONT AXLES cover the same range of purposes and capacities.

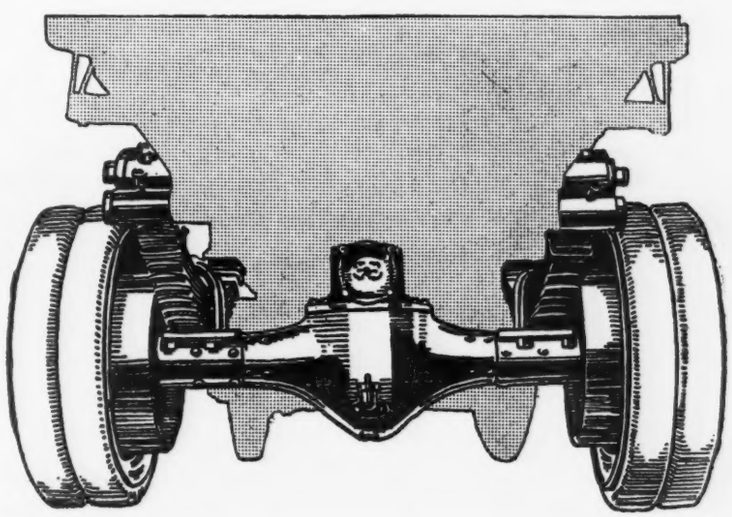
If **SHELDON** design evidences a preference for certain type of construction, know that no motive other than ultimate efficiency and service governs us.

The selling policy under which **SHELDON** Products are marketed is one of the fairest and most consistent ever conceived. Primarily it is designed to insure the unqualified satisfaction of motor vehicle manufacturers, dealers and users, and since this policy has been rounded out and put into execution it has proven to be the most economical and effective in every way.

SHELDON Products consist of worm gear rear axles, front axles and springs for trucks and pleasure cars, and brake and radius rod equipments for heavy duty trucks.

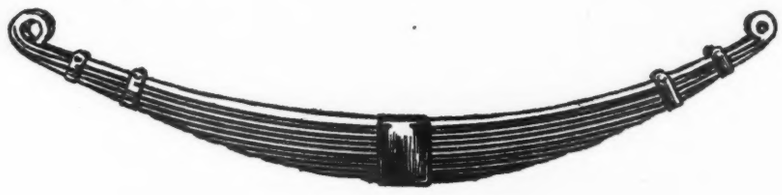
While **SHELDON WORM GEAR REAR AXLES** represent the highest sum of axle essentials and improvements, and while their efficiency is greater than any other known type or make, and while they are designed primarily for American road and load conditions, their finished appearance, clean lines and balance prove beyond question that American Automobile Manufacturers do not have to import parts or equipment when appearance plays any part in the selection of goods.

the material called for in this order on trucks with a carrying capacity as given herein. Any departure from this agreement relieves the seller of all responsibility for breakage, and the seller may at his option discontinue furnishing additional equipment for such trucks."



SHELDON
SPRINGS

The activities of the Spring Department of the SHELDON AXLE AND SPRING CO. include the design, manufacture, assembly and finishing, complete of front and rear springs, of any type, any size and length required for trucks or pleasure cars, from the lightest runabout to the heaviest truck that ever went on the road.



SHELDON SPRINGS

The rise and growth of the SHELDON AXLE AND SPRING CO.'S spring business has been steady and consistent—in exact proportion to the merits SHELDON SPRINGS possess. In the quarter century just closed the demand for SHELDON SPRINGS has grown from an unimposing beginning to the dominant place in the industry. At the present time the SHELDON SPRING PLANTS cover a total of 14 acres of ground and their combined production is over 3,000 springs daily.

It requires from 60 to 75 tons of steel to furnish the raw material for a day's work of these plants.

Just as the design and manufacture of other SHELDON PRODUCTS are conducted—engineering science, not brute instinct — governs the manufacture of SHELDON SPRINGS.

So practical is this policy that we have been able in every instance to substantiate our claims, that price and service considered, SHELDON SPRINGS are the most economical of any.

The magnitude of our business proves this.

THE SHELDON AXLE and SPRING COMPANY

MAKERS OF SPRINGS AND AXLES FOR HEAVY DUTY SERVICE FOR MORE THAN 50 YEARS

WILKES-BARRE PENNSYLVANIA

Chicago: 122 S. Michigan Blvd. San Francisco: 444 Market St. Detroit: 1215 Woodward Ave.

Wisconsin

CONSISTENT

Wisconsin Motor Wins San Diego Exposition 305-Mile Road Race

Running true to form as the world's greatest road race motor, the WISCONSIN won the first important dirt track event of 1915 —the San Diego Exposition 305-mile road race.

Earl Cooper in a WISCONSIN Motor-equipped Stutz led a field of 18 starters across the wire. Cooper's speed averaged 65.35 miles per hour—a remarkable performance when the unevenness and dangers of the Point Loma course are considered.

Three foreign speed creations went down to defeat before the unfaltering consistency of the WISCONSIN Motor.

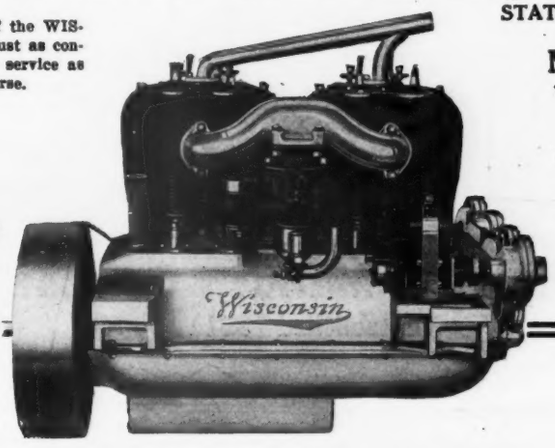
Wins Tucson 102-Mile Road Race

Dick Clarke at the wheel of a WISCONSIN Motor-equipped Stutz captured first honors in the Tucson 102-mile road race, held under the auspices of the A. A. A. Clarke started last in a field of 8 starters—overhauled one competitor after another and finished without a single stop.

Wisconsin Motor Manufacturing Company

STATION "A"
DEPT. R
Milwaukee,
Wisconsin

The performance of the WISCONSIN Motor is just as consistent in everyday service as it is on the racecourse.



Write for catalog and detailed information.

MARMON
"The Easiest Riding Car In The World"

H-2
Chicago Coliseum Jan. 23-30

will be devoted to proofs which Marmon cars offer to every prospective buyer of a really high-class car.

The appearance of these cars indicates their quality and value.

Their performance proves these qualities.

Judge them by comparison with any other car at the show — at any price—

Not by what we say but—

By what we do!

Make us prove it.

Superlatives of Speech

"Most Power"

"Greatest Efficiency"

"Finest Appearance"

"Luxurious Comfort"

"Easiest Riding"

"Best Materials"

"Superior Design"

"Extra Value"

"Unequaled Workmanship"

—and so on to the limit of the language.

These superlatives of speech can be and are used in the descriptions of practically every make of automobile.

Automobile buyers are growing wiser and these terms mean less and less every day.

Nordyke & Marmon Company

Indianapolis (Established 1851) Indiana

"Over Sixty Years of Successful Manufacturing"

MARMON
"The Easiest Riding Car In The World"

Superlatives of Performance

62.89 Miles in One Hour.

1030 Miles, Averaging 55.55.

Through White Mts. "on high."

Climbing Mt. Hamilton.

St. Louis Tour.

Arizona Tour.

Reservoir Hill, Kansas City.

Hubbard's Hill, Chicago.

Ft. George Hill, New York.

—and so on for whatever test you please.

These superlatives of performance can be and are used by one car alone—Marmon "41." Ask for full details in "Proof by Performance."

Automobile buyers are growing wiser and real proofs mean more and more every day.

H-2

Chicago Coliseum Jan. 23-30

Here's just a suggestion for any live dealer in low or medium priced cars.

In your community there are a few people whose position entitles them to demand the best.

They will not be satisfied with any "compromise" car.

They are logical Marmon buyers.

We have a proposition that will open a new and profitable business for you.

Make us prove it!

Nordyke & Marmon Company

Indianapolis (Established 1851) Indiana

"Over Sixty Years of Successful Manufacturing"

5 Oakland Superiorities

that make the car easy to sell and KEEP the owner happy

1. Great Strength with Light Weight.
2. High Speed Motor with Great Power.
3. Low Center of Gravity with Usual Road Clearance.
4. Flying Wedge Body with Least Wind Resistance.
5. Luxury with Economy.

In the New Oakland only will you find *all* of these vitals of car value. And every feature spells ECONOMY in big letters.

The man who sells the Oakland builds on a firm foundation of maximum value delivered. Every customer is a valuable asset—BECAUSE *the man who buys* the Oakland rides swiftly with comfort and safety on any road, boulevard or steep incline—and he rides at low cost per mile. Fours and Sixes speedsters, roadsters and touring cars—$1100 to $1685 f. o. b. factory. See all the new Oaklands at the Chicago Show. *Ask if your territory is open.*

Oakland Motor Company
Pontiac, Michigan

Oakland

Guaranteed Against Center Breakage

Tuthill Titanic Unbreakable Spring

Guaranteed Against Center Breakage

What Happens to Your Springs When You Brake Suddenly?

Ever stop to think of the terrible strain on your springs when one brake clamps tight and the other does not?

Ever have the leaves of your springs slide backward and forward when you hit a bump, throwing your rear axle out of true, shearing your center bolt and breaking your spring.

Ever accidentally back up against a curb and have the weight of the car throw your springs out of place?

Guaranteed breakless —lubricated springs

The Tuthill Titanic Springs will stand the strain of one brake—and the leaves can't slip—and they can be fastened on your car so they won't move backward or forward.

Tuthill Titanic Springs are guaranteed forever against center breakage—where 75% of all other springs break.

Higher quality at no higher price

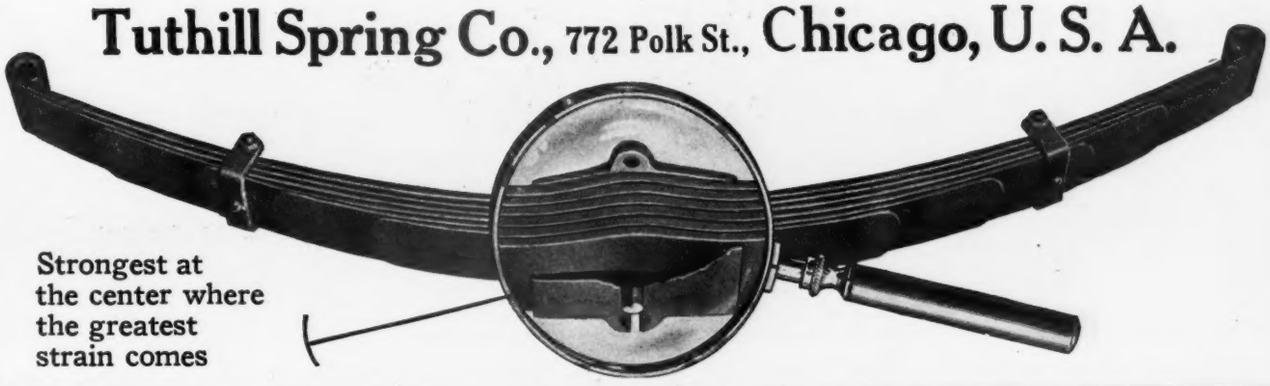
Specify Tuthill Titanics for your new car—insist on them when you break a spring—they cost no more and are safest.

No matter what make or model, there is a Tuthill Titanic for every car.

Don't invite trouble, delay and expense — see that you get Tuthill Titanics.

You Never Rode On So Easy a Riding Spring

Tuthill Spring Co., 772 Polk St., Chicago, U. S. A.



Differentials
Transmissions

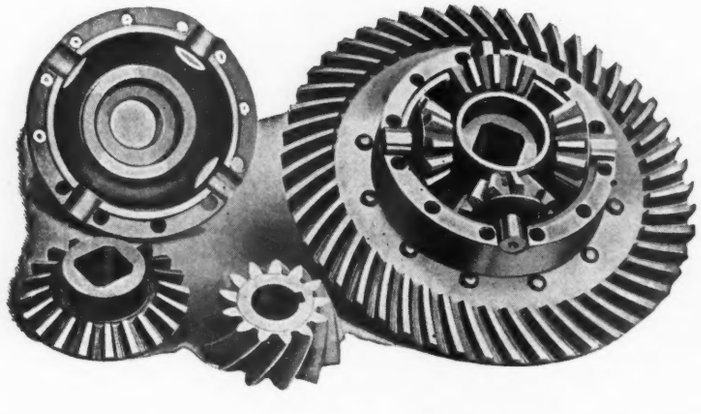
BROWN-LIPE PRODUCTS

This brief message is addressed to every person who saw our sixteen-page announcement in the January 7th issue of this publication.

We know from word of mouth of hundreds of people who did see it that the story was impressive and that it was of real interest to everybody interested in automobiles, whether as consumer or as professional. In case you are interested enough to desire a bound copy of this insert for easy reference we will be glad to mail it to you upon request.

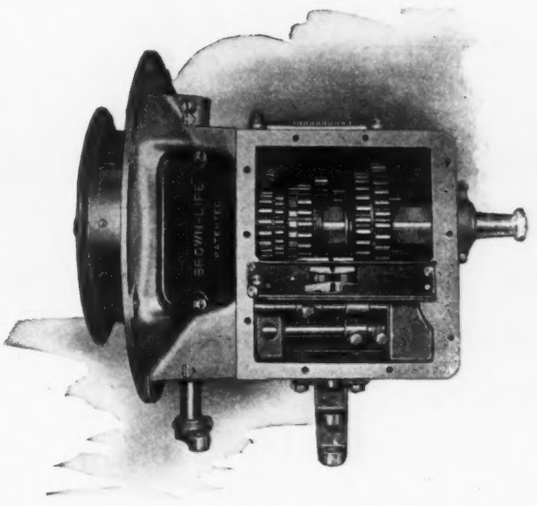
Send for this Brochure

It is absolutely to the interest of every single motorist to acquaint himself thoroughly with the mechanical and scientific problems connected with the manufacture and operation of the transmission and the differential. This is true because after all there is no one part which is subjected to more stress and wear or which plays a more important part in the right or wrong running of the car than both the transmission and the differential. And, as we stated in our preliminary announcement, the campaign that we purpose running through the coming year will be one purely of education, with a view of familiariz-



Why Brown-Lipe Products?

ing the army of car owners as well as the trade itself with the functions and construction features of transmissions and differentials themselves and in their relation to the car itself.



To those of you who will attend the Automobile Show at Chicago we particularly request that you call upon us at our exhibit—Coliseum Gallery, Space 38. If you will do so, our representatives will be glad to explain to you in detail the various points connected with the design and construction of Brown-Lipe products. They will show you graphically just what it means to hold machining operations to absolute measurement—or to a variation of .0005 part of an inch—they will show you conclusively the superiority of the design and construction of Brown-Lipe products and in many ways interest you with a detailed story of microscopical manufacturing and testing conditions that sounds more like a romance than sheer hard facts having to do with a concrete commercial business.

See Us Chicago Show

You will miss one of the real sights of the Show if you fail to look over the Brown-Lipe exhibits.

BROWN-LIPE GEAR Co
TRANSMISSIONS
SYRACUSE · · NEW YORK
Thos. J. Wetzel, 29 W. 42nd St., New York, N. Y.
K. Franklin Peterson, 122 S. Mich. Ave., Chicago, Ill.
L. D. Bolton, 2215 Dime Savings Bk. Bldg., Detroit.
DIFFERENTIALS
BROWN-LIPE-CHAPIN Co

EXTRA!
Value for $1000.

"C-5"
First Regiment
Armory
CHICAGO

Inter-State BULLETIN

Dealers!
The Chicago Show affords the best opportunity for you to get our proposition.

Volume 1 | Muncie, Indiana, January 21, 1915 | Bulletin 7

INTER-STATE SETS NEW STANDARD

New York Show Proves Success of Thousand Dollar Car—Pioneer in Field at a Fixed Price

General Manager Asserts New Car Represents Practical Selling Features Buyer Wants

A big fact that was demonstrated at the New York Show was the new standard set by the $1,000 Inter-State Four in maintaining a fixed price.

Operating one of the best equipped plants in the United States and backed by ample capital to act upon a definite policy in this regard, the Inter-State Motor Company found that dealers were deeply impressed with this policy of fixing the price.

The idea of establishing a price and maintaining it means much to the dealer who appreciates the value of being able to buy the highest quality without making the buyer lose money or be extravagant in his purchase.

The company is highly pleased with the attitude taken by the trade in regard to their price policy and feel justified in taking this action.

The new Inter-State will be exhibited in Chicago Armory, where western dealers will have a splendid opportunity to see this wonderful new car.

The manner in which the new Inter-State was received by the visiting dealers and buyers at the New York Show is highly pleasing to B. W. Twyman, General Manager of the company.

"We have proved beyond a doubt that our new product is logically correct and possesses the practical selling features that the dealer needs and the buyer wants.

"The business we have so far contracted means a wonderfully busy season for our concern.

"We will keep our price fixed and not reduce or raise it in the future. The only changes we will ever make will be in the car itself, but only when we can increase the quality of our car at the same fixed price.

"I am more than ever certain that a large majority of buyers are not looking for a cheap car, but one, at a price, that represents the quality we offer in our car."

Our Chicago Show Space Is
"C-5"
First Regiment Armory
If you do not come to the Show write us today for detail information and new circular
INTER-STATE MOTOR CO.
802 W. Willard St. Muncie, Ind.

EDITORIAL

Why $1000?

Less—Means An Inefficient Product

More—Means An Extravagant Buy

"In my personal talk to dealers I wish to impress upon you the value of making connections with a company that builds a car at a fixed price.

"Why have we selected $1,000 as the price of our car? Consider this.

"The buyer today wants in his car, Power, Comfort and Beauty. For years I have studied all makes of cars. For years I have made it a special point to ascertain just what the buyer wants, and I find it is these three qualities.

"For one thousand dollars we give in our car Power, Comfort and Beauty. Our manufacturing methods, our ample capital and buying power make it possible for us to do so.

"There are good cars below this price, but my experience has been that for many reasons it is impossible for the makers to give all three of these fundamental qualities in a car below one thousand dollars.

"A car to be absolutely efficient must contain all this quality. A car below our price means an inefficient product because of a lack of one of the other of these qualities.

"Power, Comfort and Beauty can be purchased in cars above one thousand dollars, but remember this—the manufacturer must add to his car extravagant details of equipment and finish, to justify the price, that are not essential or necessary to the buyer.

"It is in this new Inter-State that you will find the logical car for you to handle because the buyer will see at a glance that our claim of Power, Comfort and Beauty is an actuality.

"The Chicago show affords the best opportunity for you to study this car, backed by one of the biggest and best organizations in the United States."

B. W. Twyman

Dealers!
The Chicago Show affords the best opportunity for you to get our proposition.

Inter-State BULLETIN

EXTRA!
Value for $1000.
"C-5"
First Regiment Armory
CHICAGO

Volume 1 | Muncie, Indiana, January 21, 1915 | Bulletin 7

Chicago Show—The Dealers' Big Opportunity

Power?

Yes

Automobile experts of the country today are *convinced* that the *over-head valve* motor is *more powerful* than any other design.

The Inter-State Motor has been developed and improved by the Inter-State builders to such a point that it is 100% efficient under all conditions.

We *know* the thousand dollar Inter-State *is* a *powerful* car.

We can prove to *your* satisfaction by *theory* and *actual demonstration* that this car has *more* power than you will ever need. It is a duty you owe yourself as a successful dealer to ride in this car and learn that our *claim* of power is based on *facts*.

The Chicago Show offers you the best opportunity to make your own comparisons and obtain our liberal territorial plan.

Comfort?

Yes

Our experience has shown us that *comfort* in an automobile depends *largely* on *body room*, the *proper* distribution of weight, and spring suspension.

Here we claim again, that "the test of the pudding is in the eating," and that you must *see* this car to appreciate its *wonderful* quality.

The Inter-State has an abundance of room. The car is just heavy enough to eliminate any "sluggish" movement under full load, and keep the car from "bucking" and "sliding off" of the road, which is common to so many moderately priced cars.

From radiator to rear tire carrier, the weights have been *sensibly distributed*. We also offer an innovation in a popular priced car in the liberal leg room of both compartments of the car.

Proof of all this is yours for the asking—*remember that.*

And you must not forget what all this quality means to you, at a fixed price of $1,000.

Beauty?

Yes

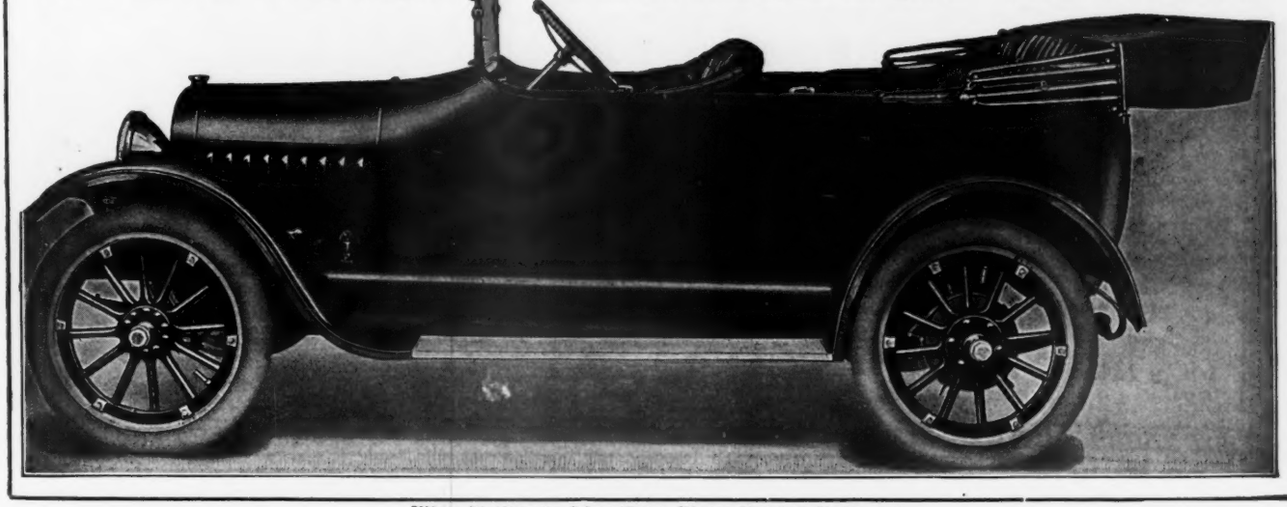
As a competitive engineer expressed it at the New York Show, "Of all the cars, this new thousand dollar Inter-State is the most *beautifully* designed and finished car for the money, I have seen."

Pick out any detail of this car and compare it with any other car and draw your own conclusion. An instance of quality to which we call your especial attention, as an example, is the upholstery.

If you visit the show or see this car in your city, just test the leather and make it a point to compare it with *any* car *regardless* of *price*. The quality is *there*—and it is the same throughout the car—highest quality—and *quality* is *always beautiful*. The Inter-State is well proportioned, luxuriously equipped, and possesses a grace and charm of appearance that it will be hard for you to duplicate for *even* more than one thousand dollars.

All that we may *say* of this new product will never bring home to you, like an actual demonstration, the fact that, the thousand dollar Inter-State is the ONE car with the greatest selling arguments in the country.

The New York Show proved conclusively that this new thousand dollar car represents the best selling proposition in the country at the price. Write for the facts.



TWITCHELL

The Best Gauge to Use Consequently the best gauge to *sell*—

The Positive Lock-Stop Twitchell Air Gauge

The best way to secure the stocking of your goods by dealers everywhere is to make an article so satisfactory and so perfect that the demand for it will be universal.

Our experience during 1913 and 1914 has convinced us that we are manufacturing such an article in the

Positive Lock-Stop TWITCHELL

Both this year and last year we had difficulty in satisfying the demand.

Don't waste your time and strength trying to push something that is anchored and can't move.

Stock goods for which there is a demand

Send in your orders now and be sure of a full supply this Spring.

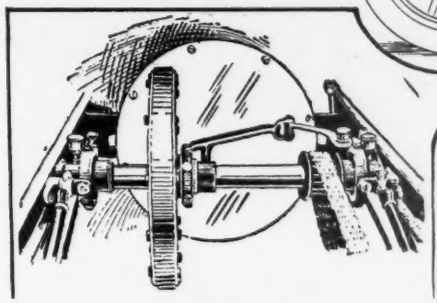
Nearly all jobbers carry the TWITCHELL. If yours does not, write us direct, giving his name, and we will see that you are supplied. See us at the Chicago Show.

The Twitchell Gauge Company, 1210 Michigan Ave. Chicago, Illinois

57A

LAMBERT

$950
$1350



The Greatest Feature of Automobile Value

GEARLESS

This is but one of the many features that go to make the Lambert the greatest value ever offered at less than $1500. It climbs 50% grades. It saves upkeep expense. Does away with grinding, noisy gears. Gives greater power. It is but one of the features that have brought us thousands of satisfied owners during 15 years of success. Ask for testimonials.

A Profit Making Proposition for Dealers—

Here's the first news of the greatest, livest proposition ever put up to progressive automobile dealers.

The new Lambert is a car of remarkable value—a car that will make profits for any dealer—but more—

It is backed by a proposition that should double or triple every dealer's sales.

The opportunity is limited, but choice territory is still open. It will pay you to find out about it—NOW!

See the Lambert Exhibit at the Chicago Show

At Space C2, Armory, main floor, January 23-30, you can see the new Lambert car and learn the details of the Lambert proposition. Providing you are not too late, if your territory is still open, we believe we can show you an unequaled profit-making proposition. Don't let this opportunity pass.

If you are not coming to the Chicago Show, it will pay you to write immediately and get the details of the new Lambert proposition. Already we are closing with representatives in all parts of the country, and it is important that you take immediate action if interested. Write—NOW!

The Buckeye Mfg. Co. 119-130 Columbus Ave. **Anderson, Ind.**

The car builder provides for his Wagner Starter when he designs his car

AN ARCHITECT does not build a house and then add a heating plant. His original plans show just where every pipe and radiator is to go. He has figured out, in advance, exactly how much radiation is required for each room and what size boiler is needed to provide the required heat in the coldest weather. If he is building in Minnesota he provides more radiation than he does if he is building in Texas. An automobile manufacturer who provides his car with

The Wagner Starter

The Starter that is built to order

follows the plans of the architect. At the time he designs his car he provides for the starter, and his blue prints show just where it is to go. He then builds a model of his engine, which he turns over to the Wagner Company. The Wagner engineers scientifically "put it through its paces." They find out exactly how much resistance the starter will have to overcome in the coldest weather—and they find out what the engine will require to keep it spinning after it is started.

With this precise knowledge they build a starter that is exactly suited to the work it has to do. If the engine is hard to turn over, but easy to keep spinning, when once started, a motor with high starting torque is built. If the engine is easy to turn over, and requires but little less to spin it, this is taken into consideration. The result is a starter that fits its job, without any surplus weight or unnecessary drain on the battery—but with ample power to start the engine under the worst conditions. More than that is extravagance—less than that is unsafe.

The Wagner starter is built by the third largest manufacturer of electrical machinery in America. Twenty-four years of specialized experience in developing and perfecting motors, both single phase and poly-phase, converters, transformers, rectifiers, and electrical instruments of precision, have made the Wagner engineers peculiarly competent to develop the automobile starter to the high state of perfection attained by the Wagner Starter.

When you see a car that is equipped with a Wagner Starter you will know that the builder of that car has had the starter built to order, and that it is precisely the starter that car needs.

Wagner, Quality

THE STERLING MARK IN THE ELECTRICAL WORLD

More about the Wagner Starter is told in our booklet, "The Starter that is Built to Order." A copy is yours for the asking.

For twenty-four years the Wagner Company has been building electrical machinery of the highest type. Satisfactory service and low final cost, rather than low first cost, is the basis of Wagner Quality. If you are interested in Wagner Quality motors, either single phase or poly-phase, converters, transformers, rectifiers, or electrical instruments of precision, and the Wagner Quality service behind them, write to the nearest Wagner branch or to the

Wagner, Quality

THE STERLING MARK IN THE ELECTRICAL WORLD

Wagner Electric Manufacturing Company, St. Louis, U. S. A.

FACTORY BRANCHES AND FULLY EQUIPPED SERVICE STATIONS

Boston	New York	Montreal	Philadelphia	Syracuse	Buffalo	Toronto
Pittsburgh	Cleveland	Cincinnati	Detroit	Chicago	Milwaukee	Minneapolis
St. Louis	New Orleans	Kansas City	Denver	Los Angeles	San Francisco	Seattle

Selling Agencies: Atlanta St. Paul Sioux City El Paso Salt Lake City

"Wagner Quality"—the Sterling Mark of the Electrical Industry

AN automobile shows its breeding—tells by its appearance and manners what kind of a family it came from. It can't be any better than the factory behind it. It either has a worthy ancestry or it is nondescript. The *National* is from one of the fine old pioneer automobile families. For fifteen years the *National* has been a successful dependable institution—always a leader no matter what new and higher automobile standards the changing seasons demanded. The new *National* represents accumulated knowledge. The management of the *National* company today is the same as fifteen years ago. *Dealers appreciate the value of this fact.* Specifications are meaningless unless there is responsibility and ability behind them in the factory. The new *National* has liberal specifications—but better still is the positive assurance that this car would not bear the name *National* unless the institution back of it guarantees it to be worthy of the unimpeachable reputation it has established. The biggest thing you get in the *National* is CONFIDENCE, both in the car itself and the dependability of the firm behind it.

Six—$2375

Seven new distinct designs, National Sixes develop any part of 55 h. p. at a fuel efficiency up to 17 miles per gallon. National car sales increased 45 per cent in 1914.

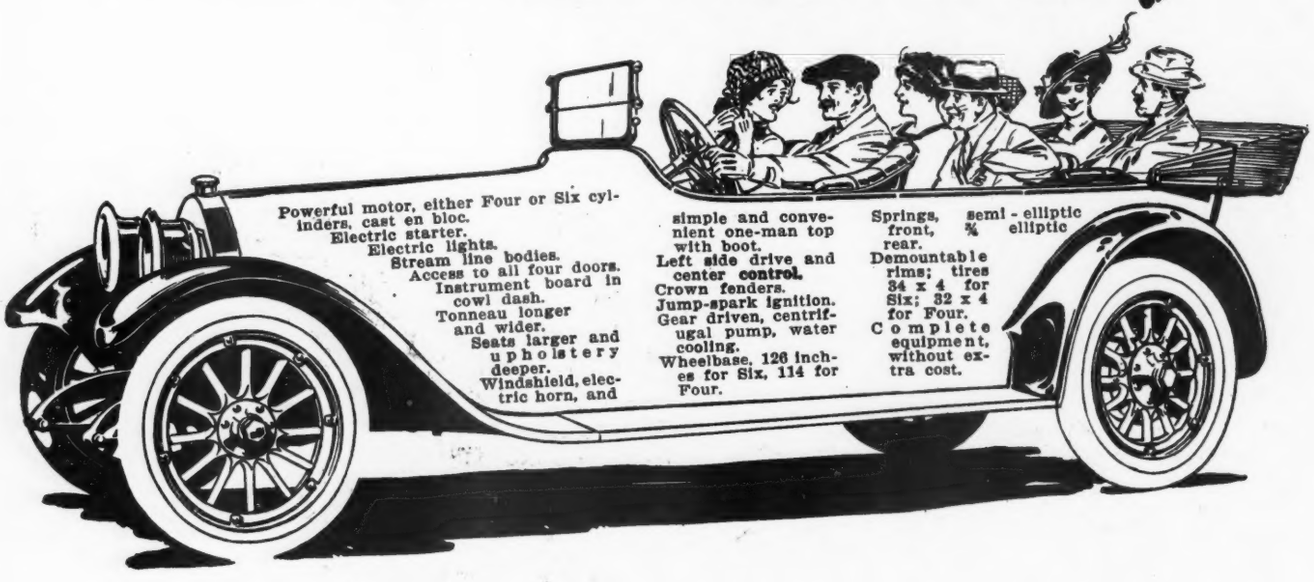
National Motor Vehicle Company, Indianapolis, Indiana

FOUR $1075

Auburn

SIX $1550

The Most for the Money


Powerful motor, either Four or Six cylinders, cast en bloc.
Electric starter.
Electric lights.
Stream line bodies.
Access to all four doors.
Instrument board in cowl dash.
Tonneau longer and wider.
Seats larger and upholstery deeper.
Windshield, electric horn, and simple and convenient one-man top with boot.
Left side drive and center control.
Crown fenders.
Jump-spark ignition.
Gear driven, centrifugal pump, water cooling.
Wheelbase, 126 inches for Six, 114 for Four.
Springs, semi-elliptic front, ¾ elliptic rear.
Demountable rims; tires 34 x 4 for Six; 32 x 4 for Four.
Complete equipment, without extra cost.

Owners of these new 1915 Auburn cars possess more than reliable machinery, skillfully put together and graced by stylish and luxurious bodies. True—these new cars are first of all mechanical things; self-propelled vehicles. But the bigger asset in Auburn ownership is the *results* owners enjoy.

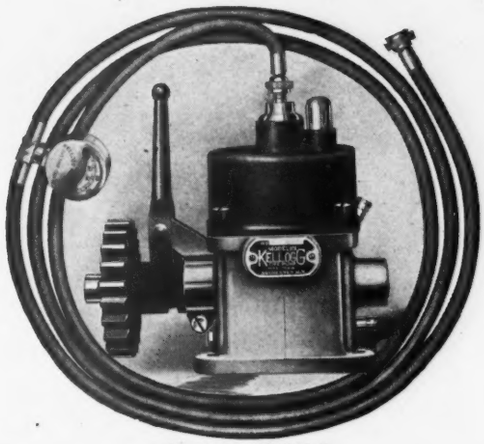
The only reason a car buyer should take pains to get the best machinery, is not in order to own gears, wheels, cylinders, etc., but that these mechanical things when put together will work in harmony and produce *long-lived* pleasure and service. This is why specifications alone—dimensions, etc.—are not dependable unless the institution back of the car is dependable. It's not only *what* goes into a car but *how* it goes in that determines what the owner will *get out* of it. The Auburn's appearance attracts, but its performance convinces. It's after years of service that you realize what an actual economy your Auburn car is. Look at it at the Auto Show—measure it point for point with others and it will win out in comparison. But go farther—run it day in and day out—month after month, and then and only then will you fully appreciate the value of having a car built and guaranteed by an old, reliable and successful company like the Auburn with fifteen years of "keeping faith" behind it.

SEE THE AUBURN EXHIBIT AT THE CHICAGO AUTO SHOW

Auburn Automobile Company, Auburn, ndiana

When Writing to Advertisers, Please Mention Motor Age.

Only One Place to Oil



No. 101 All Metal
Has four metal piston rings. Piston guides on crank shaft—not on cylinder wall. Best drop forgings, bronze bearings and close-grained cylinder iron.

We announce a special model

Ford

complete with attachments, etc., for

$9.50

Put on in 20 minutes without removing radiator.

Chicago Show
Space 25

Guaranteed Absolutely not to Spray Oil with the Air.

EVERY automobile owner now recognizes the value of a good tire pump. We not only have the perfect pump that inflates tires in two minutes, but the Kellogg attachments insure your pump becoming a permanent part of your car equipment.

Not a candidate for re-election

Engine Driven KELLOGG Tire Pump

$15 Complete with Air Hose, Air Gauge and all Attachments, carefully fitted and ready for these cars:

Abbott-Detroit	Chandler	Haynes	Kissel	Oakland	Simplex
American	Cole	Hudson	Krit	Olds	Singer
Buda Motors	Davis	Hupmobile	Lexington	Overland	Speedwell
Buick	Elkhart	Imperial	Marmon	Packard	Stearns
Cadillac	Flat	Jackson	Maxwell	Paige-Detroit	Studebaker
Cartercar	Flanders	Jeffery	Moon	Patterson	Stutz
Case	Franklin	King	National	Reo	Velie
Chalmers					Westcott

The Kellogg pump is the result of over six years' experience in making tire pumps with attachments for leading automobiles.

To Owners:
Use this Coupon. It will save time and insure getting your pump promptly. Send us name of your dealer. We guarantee satisfaction or money back.

Liberal Discounts to the Trade

Trade can use this coupon without enclosing money. Deliveries are made promptly through efficient distribution.

BRANCH OFFICES: New York Boston Chicago Detroit San Francisco

Among our leading distributors are:

R. W. Norris & Sons, Baltimore, Md.	Reinhard Brothers Co., Minneapolis, Minn.	Dyke Motor Supply Co., Pittsburgh, Pa.
Coughlin & Davis, Cincinnati, Ohio.	Motor Car Equipment Co., New York City.	Phoenix Auto Supply Co. St. Louis, Mo.
Pennsylvania Rubber & Supply Co., Cleveland, Ohio.	Powell Supply Co., Omaha, Neb.	G. Norman Baughman Co., Tampa, Fla.
G. W. Shroyer & Co., Dayton, Ohio.	J. H. McCullough & Son, Philadelphia, Pa.	Chas. Rubel & Co., Washington, D. C.

They Carry a Stock of Our Garage Pumps Also

KELLOGG MFG. CO. (221) Rochester, N. Y.
Gentlemen:—Enclosed find $15 (check, money order, draft), for which please send me one No. 101 Kellogg pump complete with air hose, air gauge, and attachments ready to install on my
Car..... Model..... Year.....
My Dealer's Name.....
Address.....
My Name .....
Address .....

Just as Comfortable

The relaxation afforded by your easiest chair, is as possible in your automobile as in your home. Soft, yielding, buoyant cushions of—

SULZBERGER'S
STERILIZED
CURLED HAIR

Automobile Upholstery De Luxe

—muffle the shocks, as you sink down into perfect ease on country road or boulevard.

You can make your automobile a portable den, if the cushions are trimmed with SULZBERGER'S Curled Hair—the vital buying-point you should consider for enjoyment from your car.

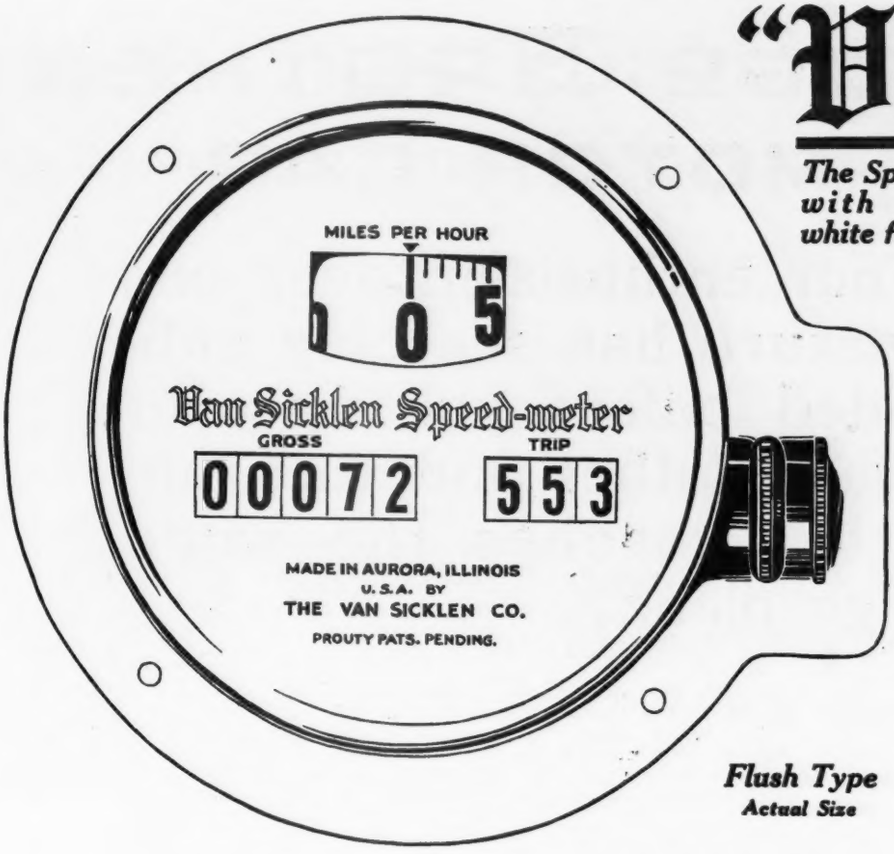
Car Manufacturers: Samples of hair cheerfully furnished on request.

See our unique exhibition at the Chicago Show,
Coliseum Gallery, Booth No. 7.

SULZBERGER & SONS CO.
Chicago **Illinois**

"Van"

The Speed-meter with the big white face - -



Flush Type
Actual Size

Van will be at the Chicago Show January 23-30, in the Coliseum Gallery, Space 92, waiting to meet you.

Once you and Van get together you'll want him for a regular passenger. Van's the best kind of company. Though he can't help you fix a tire, if you watch him, he'll keep you from having to fix the motorcycle cop.

Van is the easiest read speed indicator obtainable. Day or night you can read him from the corner of your eye. You don't have to neglect the steering wheel in an attempt to decipher him. He is plainly legible from the rear seats of a car. Van's dial is reflection-proof.

Van's operation is based on the generation and calibration of a steady flowing current of air.

The underlying principle of his construction is as old, simple and trouble-free as the wind-mill. Only no one ever thought of using the idea in connection with a speed indicator—till Van came.

Van comes in two models—Flush Type for cowl-board installation, and Special Bracket Type for Ford cars.

Van is fully guaranteed in every particular. Prices and full information sent on request.

Van has a 100,000-mile season and 100-mile trip odometer which can be reset ten times faster than other types.

THE VAN SICKLEN COMPANY
AURORA ILLINOIS

Distributors: The Beckley-Ralston Company, Chicago

T. T. Roe, 847 Golden Gate Ave., San Francisco, California, Western Representative

DODGE BROTHERS MOTOR CAR

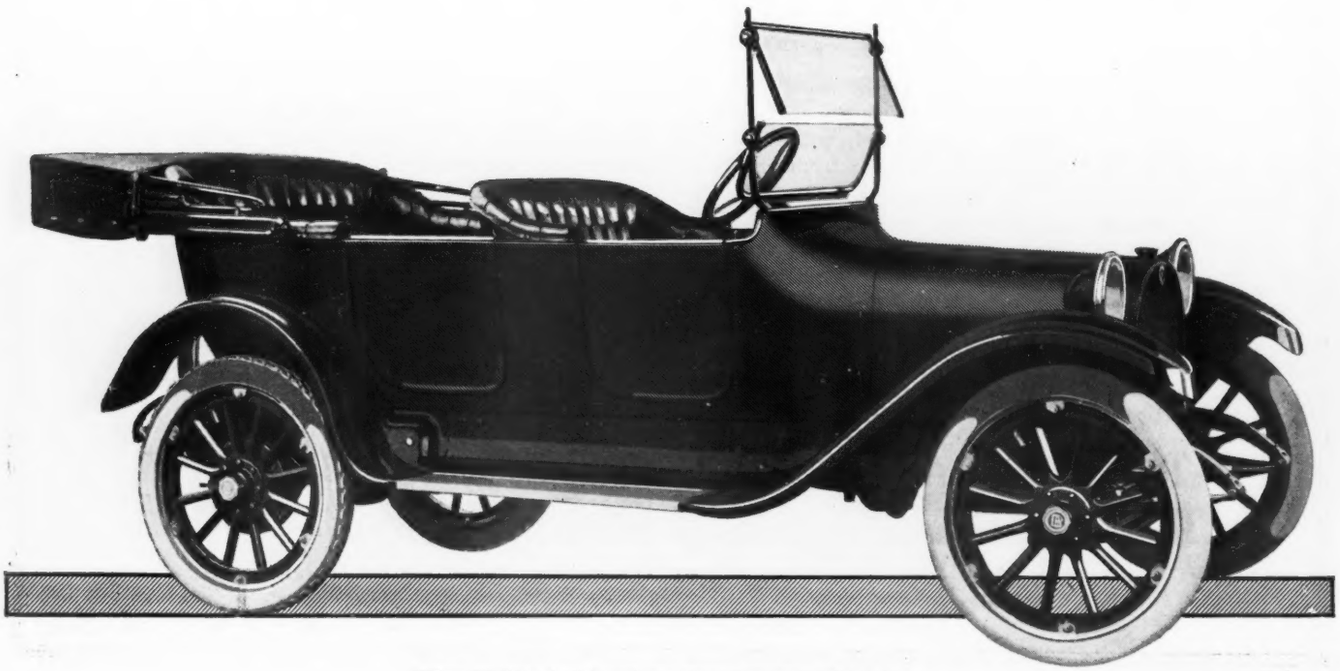
Your enthusiasm over one feature has scarcely subsided before you discover that another and then another reaches the same high plane.

The full floating rear axle seems to stand out as an extraordinary value until you discover other values equally important—as, for instance, the Chrome-Vanadium steel springs, the Chrome-Vanadium steel gears, the Timken bearings thruout, the real leather upholstering, etc.

The wheelbase is 110 inches
The price of the car complete is $785
f. o. b. Detroit

Space B-4, Armory, Chicago Automobile Show

DODGE BROTHERS, DETROIT



Why the TRINITY BELL is to be the *ultimate* type of Warning Signal

Bred in the nature of every pedestrian and driver, is the recognition of two universal danger signals—the bell and the red lantern.

Years before motor cars were known, these two signals were standardized—and accepted.

Street cars, fire engines, patrol wagons, ambulances, locomotives, street railway service wagons—vehicles that give the alternative, "move or get injured," are without exception equipped with bells.

A Bell Commands Attention As No Other Signal Can

The TRINITY BELL doesn't have to establish itself as an effective warning signal. Time and custom have done that.

And the TRINITY BELL doesn't have to prove its superiority of sound over that of squeaks and squawks. It is a known law of physics that the musical sound of a bell will carry further than a noise.

The TRINITY is a clear-toned, handsomely made bell, that pleases the eye and ear of discriminating drivers, and clears the road without dispute or offense.

The TRINITY BELL proper is surmounted by a small Tungsten light, with red lenses that flash a warning the moment the signal is sounded. Kewpies, Billikens, Policemen, Red Cross or lodge emblems may be substituted for signal lamp, at same price.

The TRINITY BELL responds instantly to touch of hand or foot, on push button. Too simple to get out of order. Is impervious to dirt and water. Has water-proof enameled coil. Beautiful in tone. Contact points of pure platinum.

Made in 3 models: Model A, for smaller cars, complete, $6. Model B, for medium cars, complete, $10. Model C, for limousines, heavy touring cars and trucks, complete, $12. All prices include entire equipment for installation. Special model for motor boats, $12.

The TRINITY answers all requirements of law, and is absolutely guaranteed. Dealers and Owners: We absolutely guarantee that the Trinity Bell is not an infringement on any other similar device.

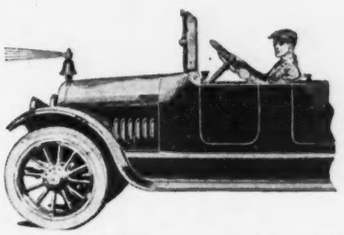
Dealers and Jobbers—The TRINITY BELL is a big seller at a good profit. Write for particulars now.

The Trinity Bell Electric Mfg. Co.

SEE US AT THE CHICAGO SHOW

5108 Calumet Avenue, Chicago

BRANCH OFFICES: Trinity Bell Sales Co., 11 N. Cascade Ave., Colorado Springs, Colo.; 2028 Farnam Ave., Omaha, Neb.; 519 Downing Bldg., Erie, Pa.

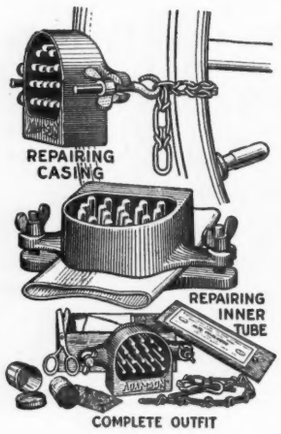


The signal that warns both eye and ear.

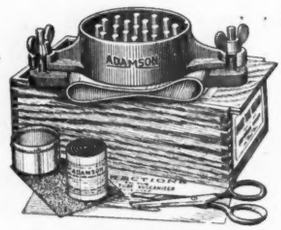
WAR IS HEL-pful!

—to ADAMSON Dealers.

Let's put an ADAMSON Vulcanizer in every "See America first" Kit!



Model "U"
For Repairing INNER TUBES and CASINGS
Price Complete $3.00



Model "T"
For Repairing INNER TUBES Only
Price Complete $2.00

THOUSANDS of people who have been "kiting" away to Europe for their vacations—to "see the sights"—will now stay at home and SEE AMERICA. Many of the better classes of people will be attracted from abroad. We will become the commercial, the educational and the sight-seeing nation.

Let's Capture the Added Domestic Business This Means For Us

Can we not—together—put an ADAMSON Vulcanizer in every "See America First" automobile kit?

There will be more overland travel in the United States—for some time. Motorists will need just the sort of service an ADAMSON Vulcanizer provides.

There is a tendency to economize which, while it may reflect itself in some lines adversely, means YOUR opportunity when it comes to selling Vulcanizers—for Adamson Vulcanizers ***save many tire dollars.***

If you sell less of one thing—you can sell more of another! We hope that EVERYTHING is moving out lively! But if you want to create still more activity—get busy with ADAMSON Vulcanizers.

ADAMSON MANUFACTURING COMPANY

Hamilton, Ont., Canada **East Palestine, Ohio**

Beautiful Streamline *Fast as a Bullet*

Cornelian Light Car

BLOOD BROS. MACHINE CO., ALLEGAN, MICH.

$410
Top and Windshield $25 Extra

$410
Top and Windshield $25 Extra

The Easiest Rider of Them All

Not a large car whittled down; but a **designed light car.** The following high grade, mechanical features are **built** into this little car.

Full floating rear axle.
Independent spring seat suspension. (Patented and a great feature.)
Streamline body with beautiful and durable baked enamel finish.
Fifteen large set New Departure ball bearings.
Standard tread. 100" wheelbase.
31 Chrome Vanadium Steel Special Drop Forgings.
The most simple, and the safest steering gear ever devised.
Sliding gear transmission with only three gears and no countershaft. (A real mechanical wonder.)
Sterling overhead valve motor, 2⅞"x4".
Eighteen horsepower! A thousand pounds!

Mechanically Perfect
A Speedy, Easy Riding, Light Car; WITH THE PUNCH

Blood Bros. Machine Company, **Allegan, Mich.**
Formerly of Kalamazoo

MADE IN DETROIT USA

NATIONAL RADIATORS

MADE IN DETROIT USA

A Startling Innovation in Radiator Construction

Heretofore most radiators have been built on the system of individual air tubes held together by soldered joints.

This system, while efficient, had one great drawback—sooner or later it was bound to leak.

THE NATIONAL RADIATOR

embodies an entirely new principle which revolutionizes pre-conceived ideas of radiator construction.

Built of continuous bands of brass.

In place of the individual cells or tubes, the NATIONAL Radiator is built up of continuous strips of tough, corrugated brass sheet, forming one homogeneous unit of great cooling capacity.

The shocks and jars of the road, which cause the gradual disintegration of the old-style radiator, are absorbed in the new corrugated construction, thus obviating the most common source of leakage and making the radiator practically everlasting.

SPECIFY NATIONAL RADIATORS—Less Weight, Greater Efficiency, Greater Capacity, More Radiating surface

THE NATIONAL CAN COMPANY, Detroit, Mich.

The Shaw Livery Company Announces Its Entry Into the Manufacture and Sale of

Shaw Taxicabs

—manufactured and guaranteed by the oldest and best known motor livery company in this country—representing 7 years' concentrated experience in the Building and Operation of taxicabs in Chicago—in short, taxicabs built by taxicab specialists.

"Taxicabs Built for Taxicab Purposes By Taxicab Operators"

It is not a light truck nor heavy touring car with a taxicab body put on it, but a compromise between the two, **especially** built to stand up under the 7-days-a-week grind of livery service.

In first cost and in maintenance cost it is the most ECONOMICAL taxicab obtainable for livery service.

Despite their extra sturdy construction, repair parts for SHAW Taxicabs can be obtained for from 20% to 50% less than similar parts for any other taxicab on the market. And you are sure of getting your repair parts from the SHAW Company whenever you want them. You are dealing with a concern of 7 years' standing—in business to stay.

The quality construction which characterizes the SHAW Taxicab throughout guarantees **continuous, trouble-free** service.

The frame is extra heavy, built to withstand tremendous stresses and strains; the motor is a famous Continental, specially designed for us; the rear axle is full-floating with helical bevel-drive gears.

Timken bearings are used throughout, exceptionally large motor bearings being used; emergency brake operates directly on the gearset.

Other Specifications—Bosch magneto and Schebler carburetor; Gray & Davis lamps; Gemmer steering gear; set-spark ignition; multiple dry disc clutch; crankshafts, camshafts, connecting rods and axles of special alloyed steel; our own patent gasoline strainer; double catch doorlocks; spare tire holder, etc., etc.

All unnecessary parts are eliminated. The car is wonderfully clean-cut and accessible and offers many other exclusive advantages for motor livery purposes.

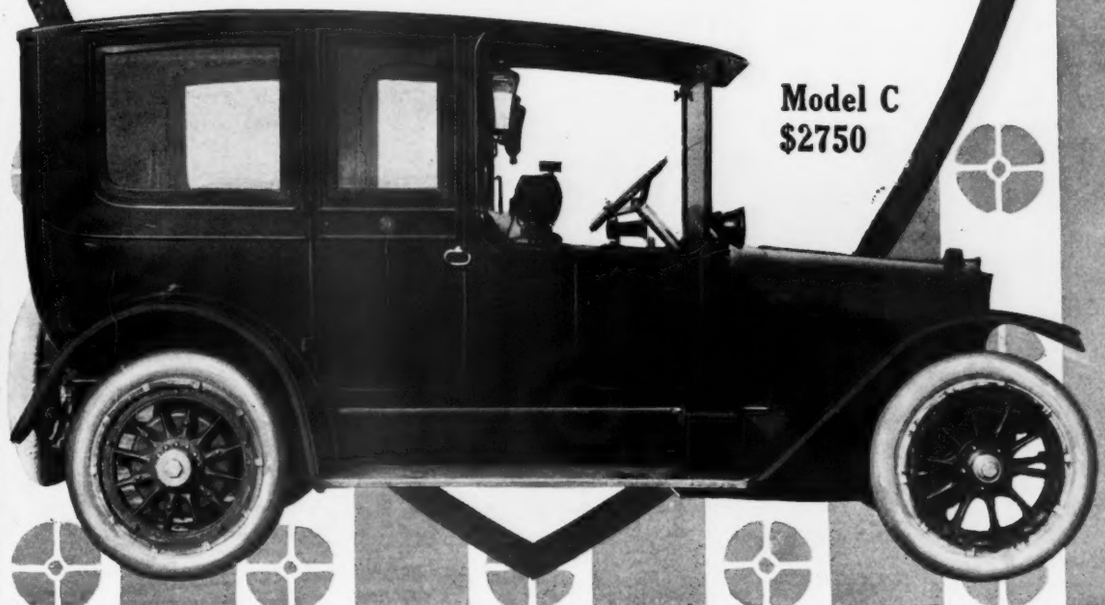
PRICES: Chassis Only, $1500

Model B, with Open Body, $2250 **Model C, with Closed Body, $2750**

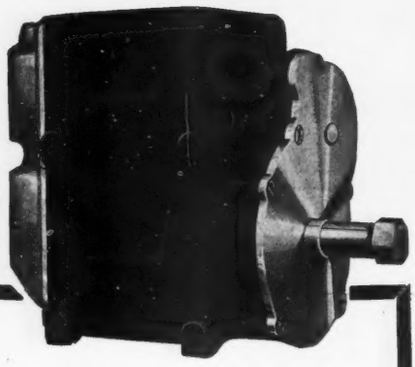
Write for Detailed Information

Walden W. Shaw Livery Company

1006 Wabash Avenue, Chicago, Illinois



Model C
$2750



DEALERS

660,000 Prospective Buyers

Everyone of the 660,000 Ford Owners is a live prospect for a dependable Electrical starting and lighting equipment.

Thorough investigation has proven that the best system is the

FISHER STARTING & LIGHTING SYSTEM

for FORD CARS

OWNERS

Enjoy more convenience and increase your pleasure by electrically cranking and lighting your car. Prevents stalled motors, accidents and provides safety and comfort.

The FISHER system is as near perfect as any piece of electrical apparatus can be. It does not return to feed off the profits, but STAYS sold. It is a business builder. You are protected by the same guarantee back of all FISHER products.

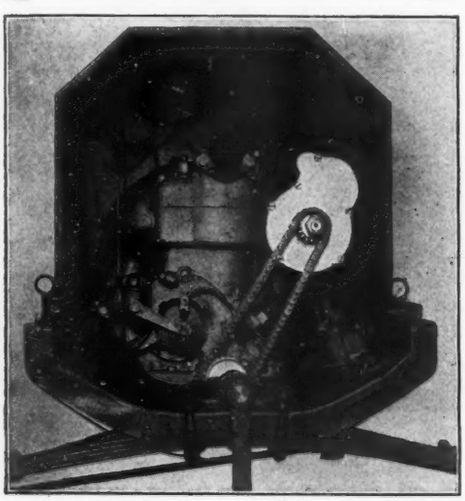
Note These Features

MOTOR and generator combined in a self-contained unit. These two machines, each of the highest efficiency and designed to perform but one function, are confined in a steel housing of great rigidity.

In operation this system is absolutely noiseless, in weight the lightest. Attached without machine work, without disfiguring car by external projections or trappy appliances.

12-volt, 3-wire system, 6-volt lamps. 47 lbs. weight.

But one connection between the lighting and starting unit and the Ford engine—made by means of a silent chain operating on two sprockets. The motor cranks the engine at a ratio of 20 to 1. No drag on the Ford engine. No reduction in power. Neither roller nor ball clutches used.



Note simplicity of mounting on Ford Cars

WE HAVEN'T ONE DISSATISFIED CUSTOMER

Our Dealer's Opportunity has unusual merit. It means Clean Profits and Satisfied Customers—your greatest asset.

Write TODAY for prices and literature well worth reading

Fisher Electrical Works

Makers of Electrical Apparatus for 30 Years

1500 Larned Street W, Detroit, Mich.

The *NEW* BRAENDER

Trade Mark

BULL DOG NON-SKID

will be
exhibited
at the
CHICAGO
[Spaces Nos. 189-190]
Show

No side skidding

Increased wearing surface

LATEST TIRE SENSATION!

The Fastest, Safest, Smoothest riding and most Durable tire made

BRAENDER RUBBER & TIRE COMPANY

250 West 54th St., New York **Factory RUTHERFORD, N. J.**

AGENTS

The Alfredal Co., 1467 S. Michigan Ave., Chicago, Ill.
Motor Accessories Co., 6521 Euclid Ave., Cleveland, O.
Southwestern Rubber Co., 902 Main St., Houston, Tex.
Mohawk Valley Supply Co., Herkimer, Syracuse and Utica, N. Y.
Franklin Rubber Co., 265 N. 4th St., Columbus, O.
Ketcham & Lawrie, 259 Halsey St., Newark, N. J.
E. B. Quarles & Co., Charles and 20th Sts., Baltimore, Md.
G. H. Snyder, 465 Fulton St., Troy, N. Y.
Asheville Steam Vulcanizing Co., 5 East College St., Asheville, N. C.
Charles A. Midelburg, Charleston, W. Va.
Stevens Hotel Co., Lake Placid, N. Y.
J. R. Johnson, Greenwich, Conn.
Gross Hardware Co., 126 Grand Ave., Milwaukee, Wis.

PAIGE

51 Bona Fide Orders At The New York Show

Is The Record That Proves Paige Cars The Greatest Dollar For Dollar Values In The Market To-day

The Paige "Six" at $1395 easily dominated every "Six" exhibited at the New York Show. With its Paige Continental motor; its separate unit Gray & Davis electric equipment; its Rayfield carburetor; Bosch magneto; Cantilever spring; Multiple disc cork insert clutch; full seven-passenger body of pure stream-line design and striking beauty, it set a value-standard and a sales-record.

The Paige model "Four-36", at its new price of $1075, is another sensation in motor car values. It contains every well-known feature of design and quality that has given a world-wide reputation for value. At $200 less than its original price it is certain to surpass all its own splendid selling records of the past.

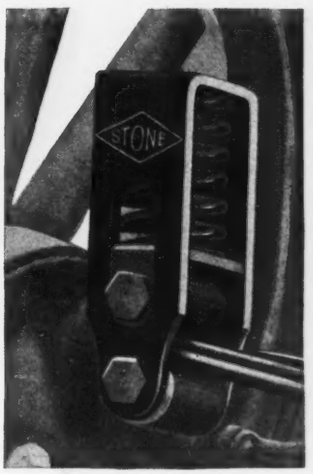
Honest comparison will prove every claim

Investigate Paige Values

Exhibited in Chicago Coliseum main floor space K-1

Paige-Detroit Motor Car Co. Detroit, Michigan

Is An Easy-Riding Ford Car Worth $4.50 MORE?



Owners of Ford Cars—Owners of Other Cars

You cannot afford—at a "saving" of less than $5—to let bumpy roads jar the usefulness from your motor, long before the end of its natural life.

And it will not "pay"—in the long run—to try to endure the relentless spinal jolts from the inequalities of the road.

STONE Shock Absorbers for Ford cars are constructed exactly like standard car size, that sell for $10, and like them are sold with—

Free Trial on Your Car

At the end of the trial—unless you are satisfied—we will take them off, absolutely without expense to you.

"Tailored To Your Car"

STONE

Ford Shock Absorbers Set Only $4.50

Other cars—Set, $10

—than the Ford. The STONE "Senior" is a shock absorber without an equal.

The STONE has no adjustments. It is "tailored to your car."

We equip your STONE absorbers with the springs your car requires—and they successfully do the work for the life of your machine.

It will pay owners of any car to investigate the many mechanical improvements in the STONE—the only shock absorber that is built to fit every individual machine.

DEALERS—A standard shock absorber, built down to fit the Ford needs, means big sales, at good profits. Write.

Ease
Comfort
Convenience
Speed

Entire Outfit Only $25

BAKER DEMOUNTABLE RIMS

This set of four entire new standard Ford wheels—equipped with BAKER Demountable Rims—extra rim, and tools, mark the passing of hard labor with clincher changes.

Quick changes, with but three bolts to loosen and tighten, take the place of the old half-hour battles with rusted rims. Five minutes is ample time to effect a complete tire change with BAKER Demountable Rims.

Also furnished for other cars.

Standard equipment on Buick, Oldsmobile, Cartercar, Oakland, Allen, and others.

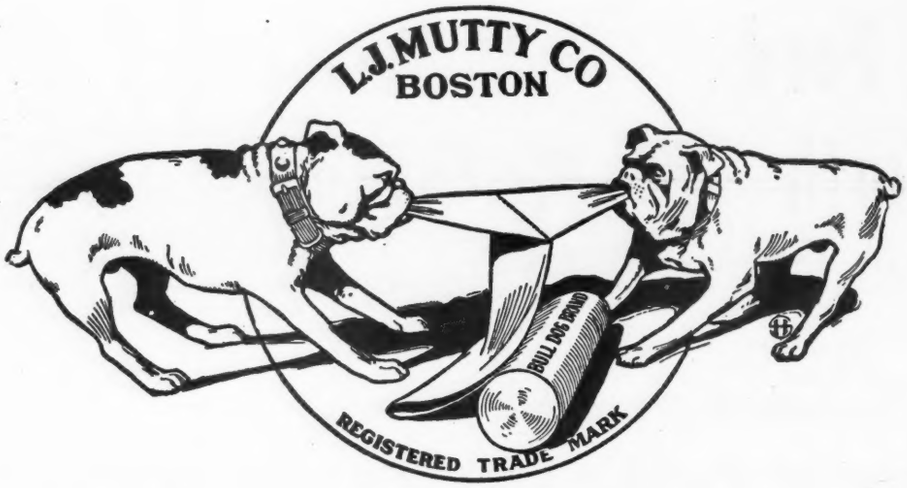
DEALERS—There is an enormous market for Baker Demountable Rims on our basis. Write for dealers' liberal discounts.

Clinchers

UNIVERSAL RIM CO.

1301 S. Michigan Ave. **Chicago, Ill.**

Baker Demountable



Bull Dog Quality Fabrics

Possess the Style, Luxury, Comfort, Service and that Snappy Appearance so necessary in the sale of any car.

Mohairs, Serges, Etc.

Of a quality that offer

Longest Service

Woven and dyed so they are

Sun and Weather-proof

ABSOLUTELY WATERPROOF
BETTER THAN LEATHER

For Automobile Tops, Curtains and Upholstery. Send for 1915 Samples.

L. J. Mutty Co. - Boston, Mass.

FEDERAL

Federal Service Is Extra Service

USERS of Federal Tires enjoy so many advantages that instinctively they think of Federals as the tires of extra service. And back of the tires they find the Federal Company, through its branches and distributors and dealers, ever ready to meet them, more than half-way, with the spirit of fair dealing.

It is easy for us to *stand back of*

The Exclusive Federal
Double-Cable-Base Tires
("Rugged" and Plain Treads)

for Federal Tires are not only made of pure para rubber and best quality "square" woven fabric, but Double-Cable-Base construction *eliminates* the four common and costly tire troubles:—rim-cutting, tube-pinching, side-wall blow-outs just above the rim and the danger of tires slipping from their rims. Federal users do not experience these annoyances and items of expense.

Genuine Protection Against Skidding

The Federal "Rugged" Tread is scientifically designed to safe-guard your car from skidding, *and it does* From every angle, the big round projections grip the slippery roadway *tenaciously*

Double-Cable-Base Tires are made in all styles and sizes

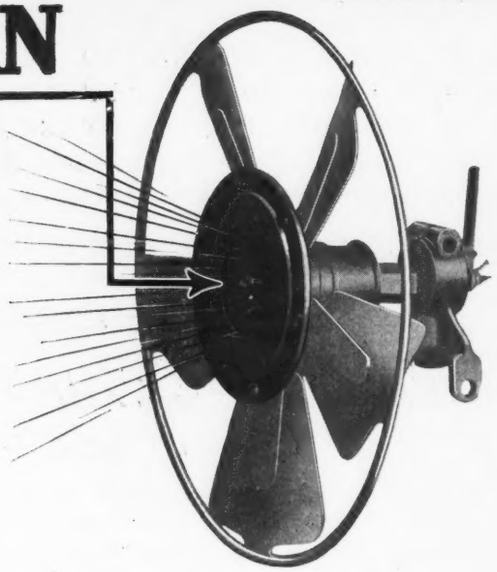
Federal Rubber Manufacturing Co.
MILWAUKEE, U. S. A.

Branches, Distributors and Service Stations in all Principal Cities Dealers Everywhere.

U.S. MAIL

SERVICE

HORN and FAN COMBINED



Touch the Button at driver's seat and get any volume or range desired

Sounds Straight Thru Radiator

Beartone is in center of cooling fan on motor—in front of motor—under the hood—directly behind radiator. Other horns at side of motor and behind the fan which forces back their volume of sound.

THE Beartone replaces "horns" as the self starter has replaced cranking. The Beartone has all the good points of both the electric and the hand horns, and more—but has not their faults. It has no motor, gears, wires, batteries or complicated mechanism to get out of order—no motor to stick in cold weather—no drain on your lights—no battery expense—no failure to signal instantly in an emergency, and boys can't sound it when car is standing idle. In ordering, state the year and model of your car. The Beartone is a horn and fan combined—one unit—and is interchangeable with the fan on your car in a minute by any one. It will last forever and forever reliable.

Lucrative Proposition for Dealers

THE Beartone gives the same mechanical action as the high grade motor-driven horn, but with no current consumption and at a low first cost. The Beartone is entirely new and different from all other horns—there is big money in it for dealers—and our plan of co-operation insures success from the start. Write us and we will explain.

For Ford
Saxon
Maxwell
Buick
Studebaker
Empire
Overland

$7

Not an Electric Horn. Operated Mechanically. *The diaphragm is fastened to the central portion of the cooling fan assembly and rotates with it. Inside the fan is a stationary piece which causes the diaphragm to vibrate when brought in contact with the latter. This stationary part is operated by small lever at back of fan bracket. Does not dim lights because it is not an electric horn. You don't have to try several times to make it sound—it responds instantly the first time.*

See Our Beartone and Oakes Fan Exhibit at the Chicago Auto Show No. 4 Armory Balcony

The Oakes Co., Indianapolis OAKES **Canadian Branch: Beartone Mfg. Co.. Berlin, Ontario, Can.**

Gould Storage Battery

Gould Starting, Lighting, and Ignition Battery

Gould Storage Battery

Plenty of light when vent is removed. Makes real inspection possible and allows hydrometer syringe to reach the right place for drawing out test sample of acid. Gassing may be detected without dismantling cell.

VENT CAP
hard rubber

INVERTED CONE
spray condenses drains back and drops into jar

Level may reach here during expansion

ACID-PROOF HANDLE
built for hard usage

Chamber integral with lower cover. No possibility of separation and leakage of electrolyte.

CORRUGATED RUBBER SLEEVE
prevents leakage

FUNNEL
avoids slopping and overflow in filling

Forms additional lock to hold top and bottom

LEAD CONNECTORS
with copper reinforcements

COPPER REINFORCEMENT
adds strength and conductivity

UPPER COVER
hard rubber

SEALING COMPOUND

EXPANSION CHAMBER
extra large

LOWER COVER
hard rubber

JAR
hard rubber

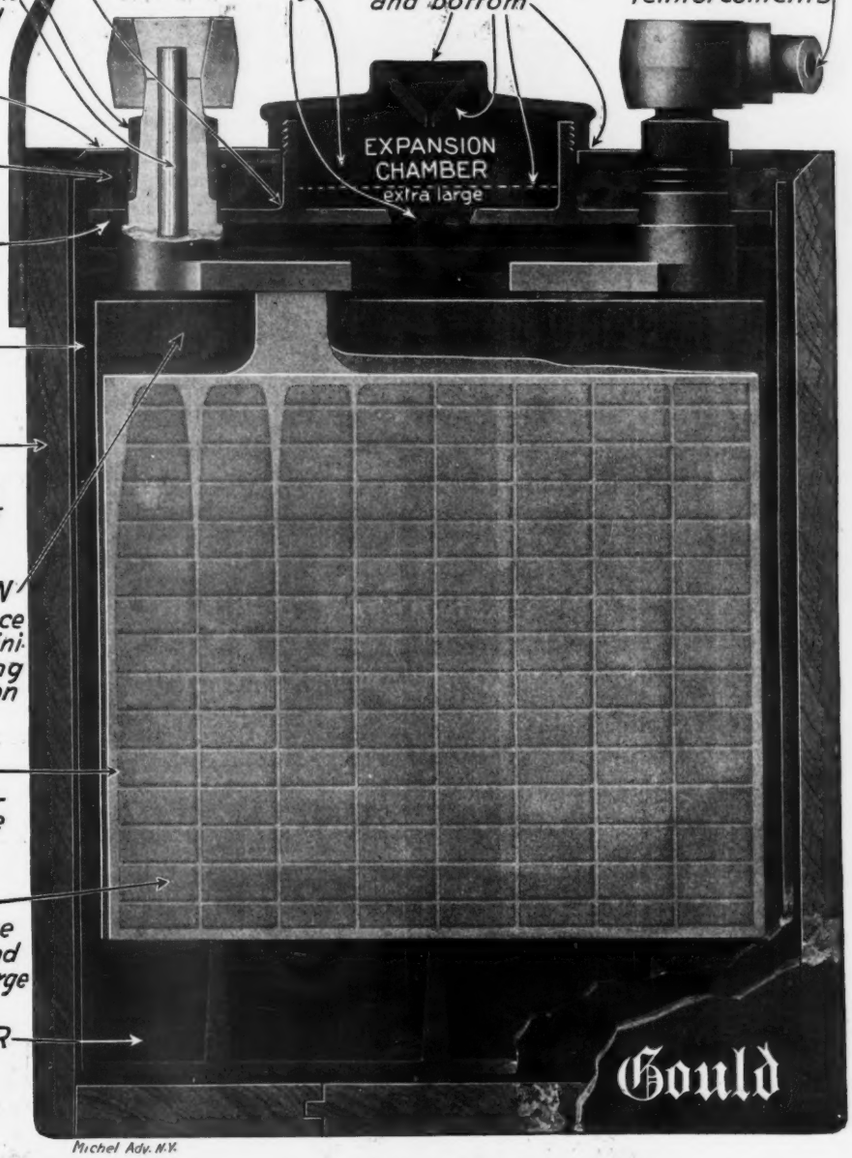
BOX
wood, lock-jointed painted inside and out with acid-proof paint

LARGE SEPARATION
provides for abundance of electrolyte and minimizes short circuiting and heating of cell on charge

GRID
reinforced to withstand hard service

HARD PASTE COMPOSITION
to withstand severe vibration, jolting and continuous overcharge

SEDIMENT CHAMBER



Michel Adv. N.Y.

Gould Storage Battery Co.

General Offices: 30 E. 42d St., New York City **Works: Depew, New York**

Boston—14-16 Cambria St. Philadelphia—613 Betz Bldg. Cleveland—1761-5 E. 18th St. Detroit—Kerr Bldg. Chicago—225 E. 22d St. San Francisco—1448 Van Ness Ave. Los Angeles—110 E. Pico St.

AGENTS in Washington, Rochester, Buffalo, Pittsburgh, Milwaukee, Minneapolis, St. Paul, Kansas City, Omaha, Denver, Topeka, Seattle.

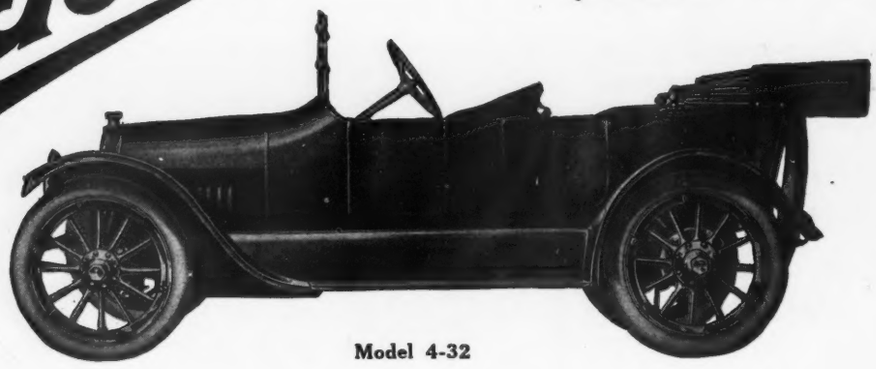
CANADIAN REPRESENTATIVE: R. E. T. Pringle, Toronto, Montreal, Winnipeg, Vancouver.

Full stock of parts, plates and repairs carried by all offices and agents

Paterson

Four Cylinder, Long stroke Motor, Delco Starting and Lighting System,

$1095



Model 4-32

To the Man Who Sells Motor Cars

The PATERSON line of motor cars is the line with the VALUE, STYLE and FINISH, made in Flint, Mich., by W. A. Paterson Company, one of the strongest organizations in the business, who have had forty years' experience in the manufacturing industry.

The PATERSON car for 1915 represents the total and combined knowledge of the best and most carefully trained engineers in the automobile industry. This statement is proven by the fact that PATERSON QUALITY reflects the combined buying powers that compose the acknowledged leaders of the automobile world.

Our Four and Six cylinder cars are fitted with NORTHWAY long stroke motors, Weston-Mott full floating demountable rear axles, Delco Single Unit Starting and Lighting system, Stromberg carburetors, One-Man Top, and other high grade units installed and applied the PATERSON way.

We are soliciting the business of distributors in the different automobile centers, who have an established trade, and a line of agents that can and will push a standardized line of automobiles that have the VALUE, STYLE and FINISH.

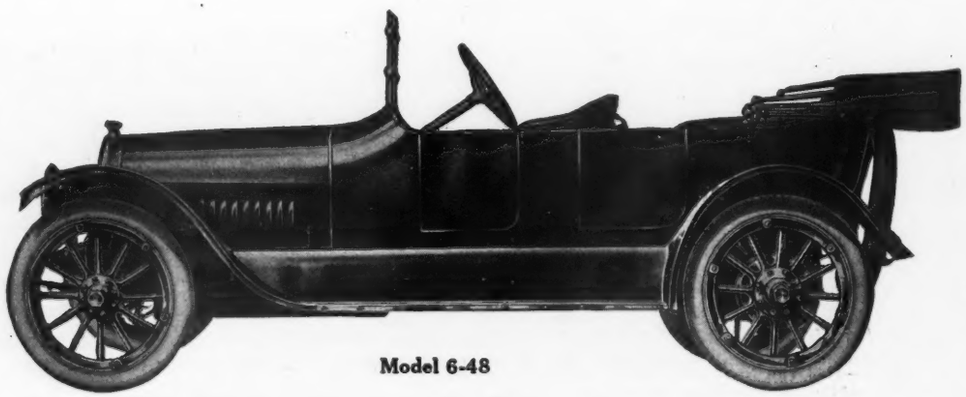
Our distributors' proposition is an attractive one, and our local agency contract deal will interest any high class dealer that desires to handle a line that will help him in building up a trade that will increase from year to year and stay with him.

W. A. PATERSON COMPANY

FLINT **MICHIGAN**

Six Cylinder, Long stroke Motor, Delco Lighting and Starting System,

$1495



Model 6-48

The book is over four times the size of the Illustration

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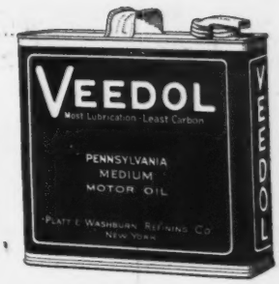
PRICE 25 CENTS
SYSTEM 2—SPLASH, WITH CIRCULATING PUMP



100% Efficiency
Most Lubrication
Least Carbon

Do Not Fail to see our Exhibit at Chicago, Booth 180-182 Coliseum Annex

Be sure to call on us.

We shall display charts and diagrams of working parts—specially prepared in colors showing how proper lubrication will prolong the life of your motor and cut your expense account. This exhibit is an education in itself both to the car owner and to the dealer.

We have spared neither time nor expense to make this complete in every detail so that in a few moments the visitor can get a thorough understanding of the ten important lubricating systems and the requirements that must be met to get 100% efficient lubrication.

FREE The Most Scientific Book on Lubrication Ever Written

What this book contains

This book—the largest and most complete book on lubrication ever written — contains 44 big size pages and 48 original colored illustrations. It fully describes how over a thousand tests were made and gives hundreds of facts and figures of infinite value to every motorist and dealer.

Full details of how to care for and prolong the life of your engine are included in the book. It covers fully the ten important lubricating systems and tells how you can prove the quality of oil for yourself.

The expense involved has at all times been considered secondary to the big purpose of obtaining correct facts and figures for owners and dealers.

Motorists and dealers—read this news:

After many years of patient work and thousands of tests the Platt & Washburn Refining Co. have at last separated the "wheat from the chaff" in the lubrication field. In the only Motor Testing Laboratory in the world they have tried out every kind of motor with every kind and grade of oil. They have discovered the best grade of oil for each motor and have published a 44 page volume containing new information that you cannot obtain elsewhere at any price. If the question of lubrication has not been serious with you, read on. You cannot afford to miss this.

What this book means to you

When you read the text and see the charts and the results of the tests, you will say:—"This is what I have wanted to know for years—this is real help on the oil question." You will understand the design of your motor. You can learn how to keep it running smooth as velvet—free from disagreeable rattles. You can thoroughly understand your engine's oiling system. It tells you how to lengthen the life of your motor.

You will realize the full joy and exhilaration of motoring only when you are able to forget most of the common troubles. This book tells facts which will enable you to cut your repair bills and avoid replacement of expensive parts.

To Dealers

When you sell oil to your customers you want to know that it is the best oil obtainable. You want to prove that it is the only oil that you yourself would use and that you are doing your customers a real service when you sell it to them.

Veedol dealers have the full energy of a great, striving, growing firm back of them—ready to supply the dealers with abundant sales helps—booklets with the dealer's name on the cover, store hangers and charts, outdoor signs with his garage's name on them, pennants and samples. By selling Veedol you will make bigger profits than ever before. Write today for **Special Offer.**

Platt & Washburn Refining Co.,
51 Broadway, New York:

Please send me, free of cost, a copy of your VEEDOL Book.

Name .....

Address ..... (Street)

(Town)..... (State).....

I am interested in your special co-operation offer.

I drive a.....(Automobile)

.....(Boat).....(Truck)

PLATT & WASHBURN REFINING COMPANY

Established 1878
Incorporated 1885

General Office, 51 Broadway, New York

Chicago Los Angeles Philadelphia Syracuse Boston St. John, N. B.

Supreme Auto Oil

Light Medium Heavy
High Viscosity Low Cold Test

The Ideal Cold Weather Oil

Burns cleanly—leaving a minimum carbon deposit

Does Not Congeal—Flows Freely At Zero

SUPREME AUTO OIL is especially manufactured to supply the demand for a better cold weather oil. Refined by our special process under the careful supervision of expert chemists, it will conform to the requirements of any lubricating system and economically minimize mechanical friction.

THERE IS MORE POWER IN
THAT GOOD GULF GASOLINE

We have an attractive proposition for Dealers and Garages. Write our nearest office

GULF REFINING COMPANY

General Sales Offices
PITTSBURGH, PA., U. S. A.

DISTRICT SALES OFFICES:

New York Philadelphia Boston Atlanta
Tampa New Orleans Houston

WRITE FOR OUR BOOKLET "PROGRESSIVE LUBRICATION"—SENT FREE

When Writing to Advertisers, Please Mention Motor Age

The Ross Eight $1350

Specifications of the "Ross Eight"

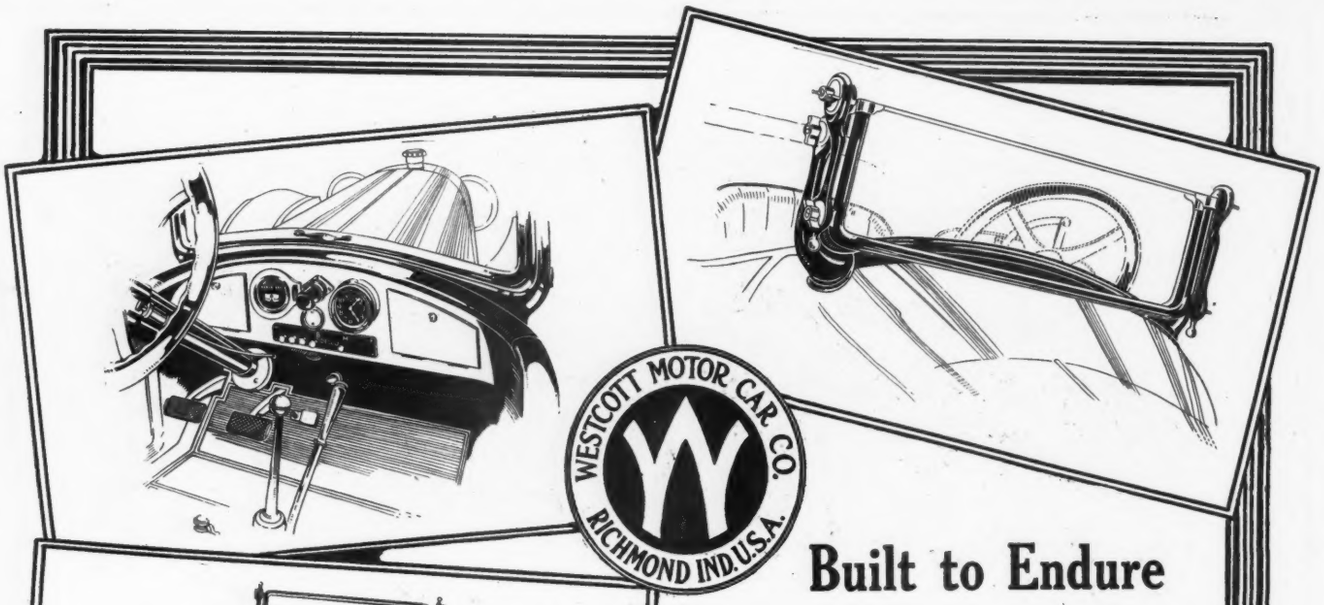
AXLES—Timken Standard Front and Rear.
MOTOR—Our own Standard Eight "V" type; bore, 3 inches; stroke, 4½ inches.
CRANKSHAFT—3 bearing, 1¾" diameter.
VALVE TAPPETS—Accessible for adjustment.
LUBRICATION—Forced feed for crankshaft, camshaft and cylinders.
CLUTCH—Multiple disc, cork insert.
TRANSMISSION — Three speed and reverse, center control.
ELECTRIC STARTING AND LIGHTING SYSTEM—Our own.
WINDSHIELD—Rain-vision, ventilating.
GASOLENE TANK in rear, Stewart Vacuum System.
STEWART Speedometer.
RADIATOR—Cellular.
BODY—Streamline, full five passenger.
UPHOLSTERING—Genuine Spanish leather, long hair filled.
WHEEL BASE—115 inches.
TOP—One man, five bow.
SPRINGS—Semi-elliptic front; ¾ elliptic, extra long, rear.
TIRES—34" x 4" Goodyear non-skid in rear, smooth in front.
RIMS—Quick demountable.
WHEELS—Artillery type, selected stock, natural wood finish.

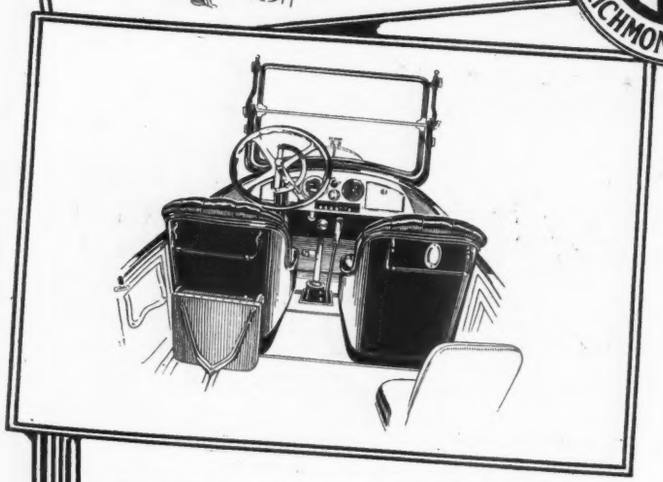
There is no eight to equal it selling under $1,900.00 We have an enviable reputation as builders of engines and motor parts covering a period of over eleven years, and we have, for the past two years, built complete for others, a car well known to the public. If you do not know us it is time you got acquainted for we are in the business for keeps. Investigate our reputation and stability and then apply for territory. See our exhibit at La Salle Hotel, Chicago, during show week. Above all, do not close with any manufacturer until you have seen the best Eight Cylinder car in its class.

THE ROSS & YOUNG MACHINE CO.

(ROSS AUTOMOBILE CO.)

Jefferson and McDougall Aves. **Detroit, Mich.**





WESTCOTT MOTOR CAR CO. RICHMOND IND. U.S.A.

Built to Endure

Made on Honor and Sold with the Idea of Perpetuating the Fame of the name

Westcott

The Westcott line is honestly made; mechanically perfect; distinctively beautiful; sensibly, even luxuriously appointed, and fathered by an ambition worthy of the term "Westcott Creed."

The Westcott could be more expensive but it could not be better in the qualities for which the motorist has been heretofore obliged to pay considerably more.

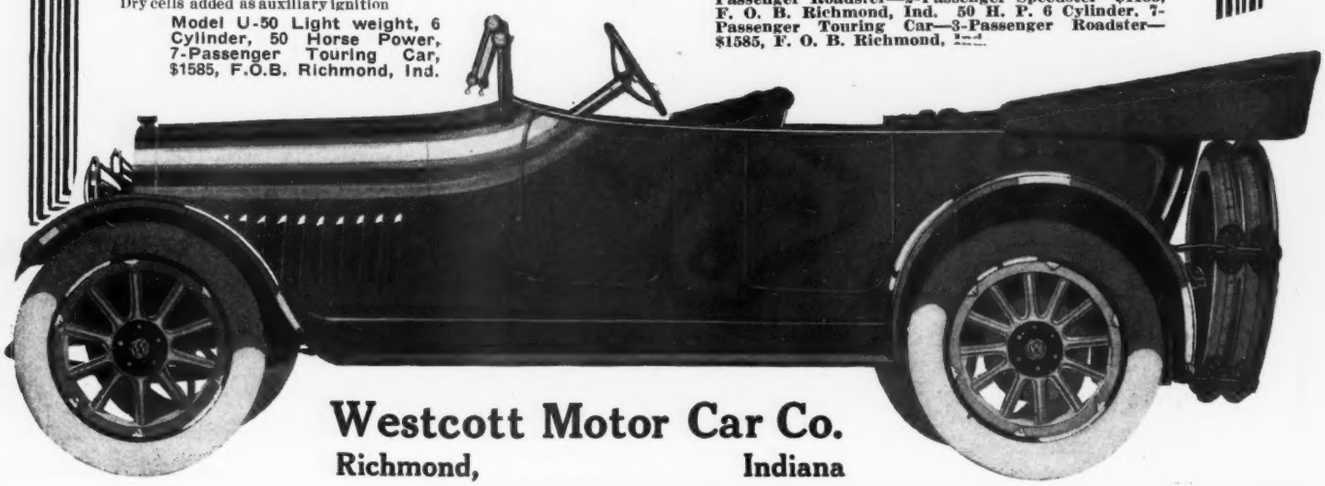
Be sure to see the Westcott Exhibit at the Chicago Show in Space B-8, Main Floor, First Reg. Armory

DEALERS Your connection with this financially strong and old established house will benefit you. Write for particulars.

Nine Perfection piston rings on each piston
New designed cam shaft with higher lift
Timken axles
Worm bevel gears
Automatic spark advance
Advanced type of streamline body
Headlight dimmer switch
Non-skid rear tires
Aluminum covered running boards
Solid walnut instrument board
Flush tonneau light
Rim wind and rim set clock
Combined instrument board lamp & inspection lamp (new feature)
Westcott design disappearing auxiliary seats
All wires in metal armor
New and exclusive method of upholstering, more comfortable and durable
Ample aisle way between front seats
Dry cells added as auxiliary ignition
Firestone demountable rims
Non-rattling doors, new style bumper
Crowned fenders
One-man top
Gas tank in rear, with gasoline gauge
Stewart vacuum gasoline system
Highest grade folding, double ventilating windshield
Klaxon make electric horn
New spark control, both hand throttle and hand spark control
Jiffy adjustable curtains carried in top
Standard Delco lighting and starting system
Black enameled cellular molded radiator
Highest quality improved leather
Cantilever rear springs 52" long
Larger valves tungsten steel
Northway motor

Model U-50 Light weight, 6 Cylinder, 50 Horse Power, 7-Passenger Touring Car, $1585, F.O.B. Richmond, Ind.

35 H. P. 4 Cylinder, 5-Passenger Touring Car—3-Passenger Roadster—2-Passenger Speedster—$1185, F. O. B. Richmond, Ind. 50 H. P. 6 Cylinder, 7-Passenger Touring Car—3-Passenger Roadster—$1585, F. O. B. Richmond, Ind.



Westcott Motor Car Co.

Richmond, Indiana

Polarine

FRICTION REDUCING MOTOR OIL

Makes Winter Driving Safe

Zero weather will not affect the flexibility of your engine if you lubricate with POLARINE. You can use your car on the coldest day without risk of stalling from frozen oil.

Because POLARINE flows freely at zero, maintaining the correct lubricating body at any motor speed or temperature.

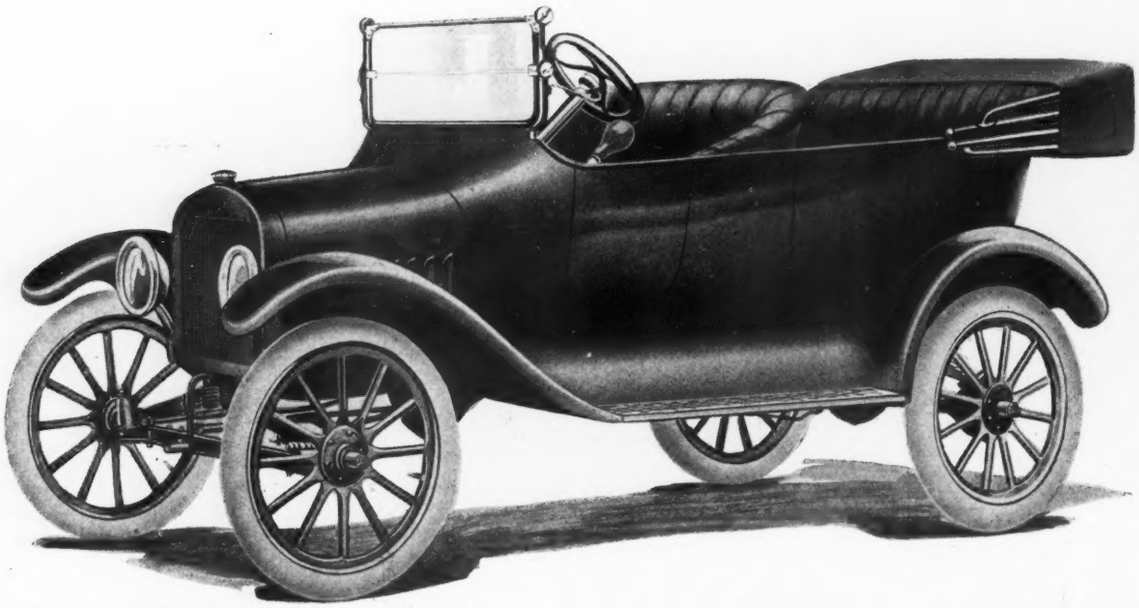
POLARINE minimizes carbon deposits and secures maximum power. It increases efficiency, reduces friction and lengthens the life of your car.

POLARINE is made by the Standard Oil Company, the great *service organization* on which American motorists depend for reliable motor supplies.

Sold with a guarantee of satisfaction. Known as the *Perfect Summer and Winter Motor Oil.*

STANDARD OIL COMPANY
(AN INDIANA CORPORATION)
CHICAGO

RED CROWN GASOLINE
Car and Money Go Farther



HOW WOULD YOU LIKE YOUR FORD THIS WAY?

For $135 we will transform your Ford into a car that will look the equal of any car in the thousand dollar class.

We all like to have our belongings distinctive. That is why we will pay $40 or $50 for a suit when we could get a uniform for half that figure.

This equipment will work a marvelous transformation on your car.

It will make people ask "Where did you get your new car?" "What did you do —trade in your old Ford?" "How much did you pay for it—$900 or $1,000?"

Look at this body and hood. Compare them with the high-priced cars you know of.

It is a perfect streamline body and the hood is the kind that you won't find on cars costing less than $1,000.

Then the oval fenders are as much a mark of the up-to-the-minute car as the grey topped shoes are the mark of modishness in milady's costume.

Then think of the convenience of a one-man top and a clear-vision windshield.

Certainly any Ford owner can get more actual comfort and satisfaction out of this $135 than out of any other investment that he could possibly make.

Clip and send the coupon TODAY, SURE.

IMPROVED CAR CO.,
660 Commonwealth Ave.,
Detroit, Michigan.
Please send me details concerning your proposition in this advertisement.

.....

.....

.....

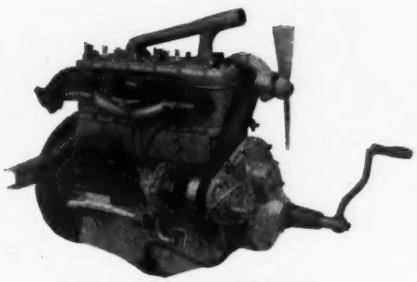
Improved Car Company
660 Commonwealth Ave.
Detroit, Mich.

$135.00

Complete ready to place on chassis.
Stream-line body.
One man top.
Special radiator hood.
Complete set oval fenders.

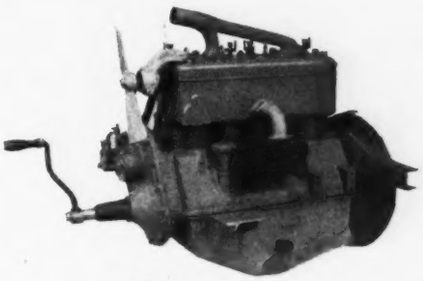
THE RUTENBER MOTOR

These Models Exhibited at Auditorium Hotel, Room 142 Chicago, January 23-30

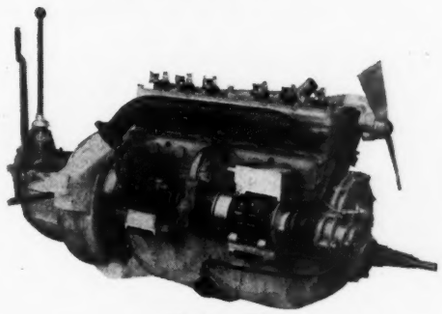


Valve Side

New Model 20 4-Cylinder 3½ x 5



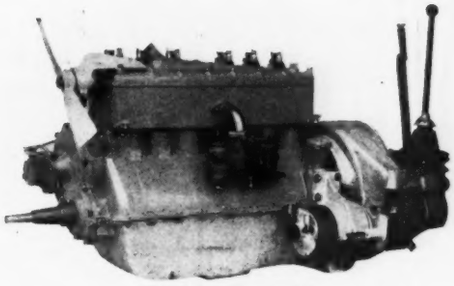
Carburetor Side



Valve Side

Showing generator and transmission application

Model 22 6-Cylinder 3 x 5



Carburetor Side

Showing starter and transmission application

LATEST DESIGN—POPULAR PRICES—RUTENBER QUALITY

Automobile and truck manufacturers are urged to examine these and other Rutenber models at Auditorium Hotel through Chicago Show Week, January 23-30

RUTENBER MOTOR COMPANY

Factory and General Offices, Marion, Ind.

Chicago Office, 621 Otis Bldg. **Chicago Service Station, Chas. E. Hagmann, Hoyne & Jackson Blvd.**

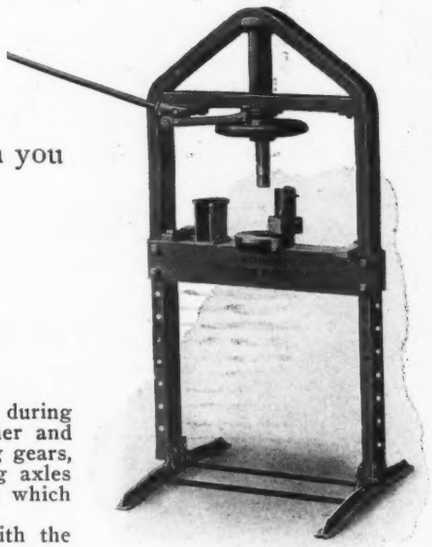
Space 157 and 158 at the Chicago Show

"The WEAVER Line"

Write it down in your note book—

"Space 157-8 Coliseum Annex (Second Floor)"

As a dollars and cents proposition you need the



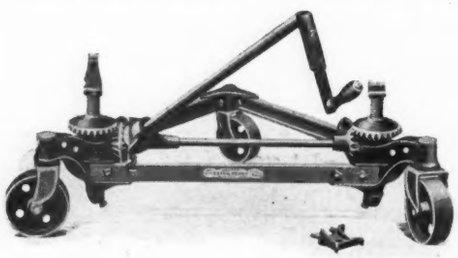
WEAVER GARAGE PRESS

Capacity 20 Tons

ESTIMATE the time you have wasted during the past week using a sledge hammer and other improvised devices for removing gears, ball races, bands or hubs, in straightening axles and shafts and the many other operations which OUGHT to be done with a PRESS.

Then compare the cost of that time with the cost of a Weaver Garage Press. You'll be surprised how quickly it will pay for itself, besides giving you an equipment which will be a drawing card among the trade.

Construction. One piece heavy channel frame; 15-inch hand wheel carried on ball bearings; 2-inch screw with Bronze Thrust Bearings. The hand lever has leverage of 1,500 to 1; the screw does not revolve. Maximum perpendicular capacity 48 inches; range of screw 12 inches; width between frame 32 inches; weight 425 lbs. **Net price**..... **$48**



WEAVER AUTO TWIN-JACKS

Made in TWO Sizes

In the handling of automobiles ANYWHERE, Weaver Auto Twin-Jacks are a recognized necessity.

They combine into one conveniently operated unit all the service and ADVANTAGES of the Turn Table, Lifting Jack, Transporting Truck, and Tire Rest.

You can't do business ECONOMICALLY without them.

MADE IN TWO SIZES

"Extra Heavy" (shown above), Cap. 8,000 lbs.		**Regular Type, Cap. 4,000 lbs.**	
Per Set (Two)	**$36.00**	Per Set (Two)	**$20.00**
Singly	**20.00**	Singly	**12.00**

WEAVER AUTO AMBULANCE

"FOR CRIPPLED CARS"

A Weaver "Ambulance," a runabout, and ONE man can handle a wrecked car to better advantage than THREE men can do it with the **improvised** devices usually employed.

Scientifically designed to meet all conditions, this Ambulance can be readily attached to either front or rear axle; full range of adjustments; high, broad, CAST STEEL wheels, will stand the service on city pavements or country roads. Telescoping tongue of double strength steel tubing; roller bearing 1¼ inch steel axle; weight 140 lbs.
Price, complete..... **$30**

WEAVER MFG. CO., Springfield, Illinois

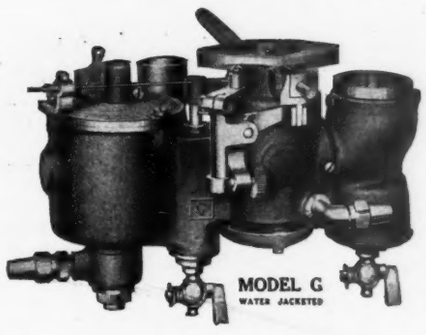
RAYFIELD CARBURETORS

ONLY Quality Cars Use Rayfield Carburetors.

You can place a lot of confidence in the manufacturer who equips the car he offers you with the Rayfield carburetor, which is the best and highest priced carburetor he can buy.

That car is built on a quality basis or it wouldn't have the Rayfield on it. It would have some cheaper carburetor.

Your Rayfield-equipped car in the first month's driving will not only give you greatly improved all-around performance, because of the Rayfield carburetor, but it will save you enough in gasoline alone to more than make up the little extra it costs the manufacturer.



To Show Visitors—*Make our branch, 1140 Michigan Avenue, your headquarters while attending the Chicago Show.*

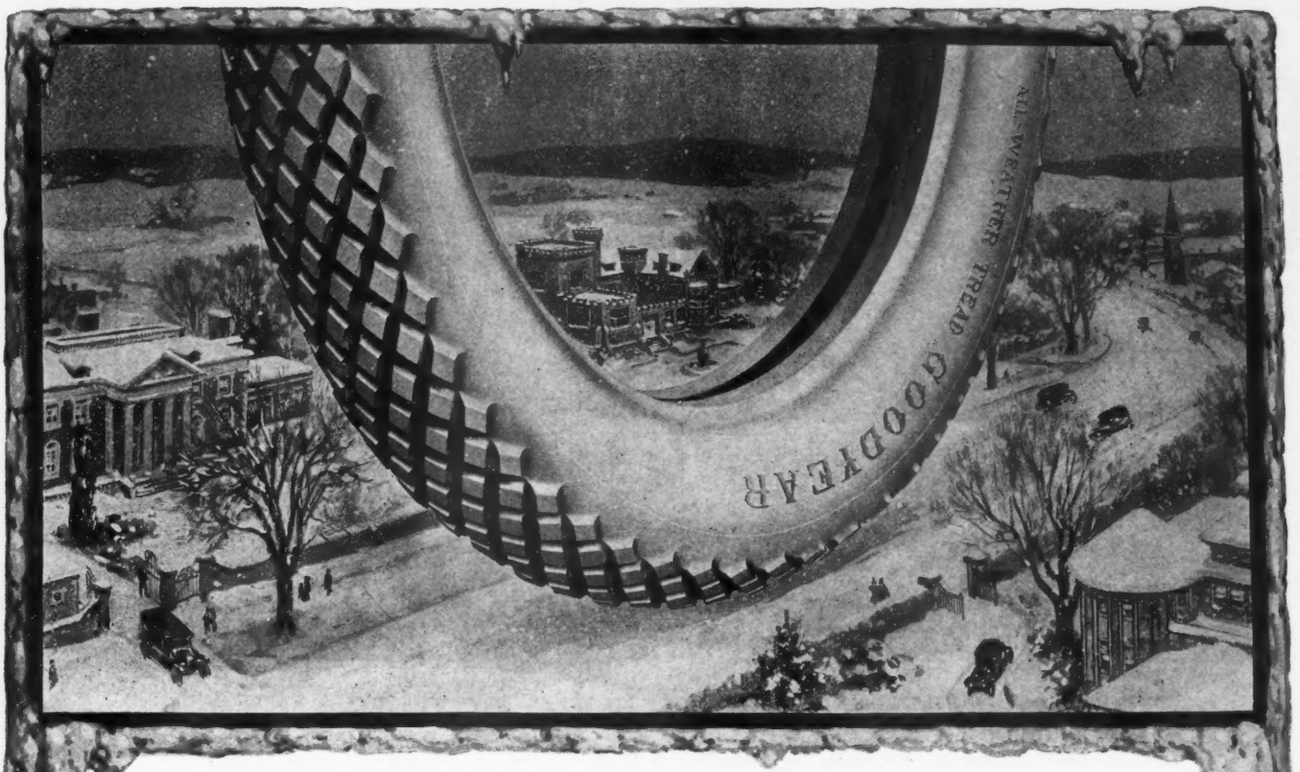
Have your mail addressed there. We will take care of it and make you welcome. Chicago Show Space—Coliseum Gallery, Space 35.

Rayfield equipment is the sure sign of a generously built car.

FINDEISEN & KROPF MANUFACTURING CO.

2109 Rockwell Street, Chicago, Illinois

Branches: 1140 Michigan Ave., Chicago 1211 Woodward Ave., Detroit 1902 Broadway, New York



Maximum Protection

In Five Ways Excelling Every Rival Tire

Do not these five protections cover what you most want in a tire?

If so, mark this: Goodyear Fortified Tires offer all of them. No other tire offers one of them, in our way or to our extent.

And these things, we claim, mark the quality tire, when combined with the best in rubber, fabric and making.

Men who know these tires agree with us. Goodyears have more users than any other tire that's built. Those users last year bought very close to a million and a half of these tires.

Five Supremacies

Goodyear Fortified Tires stand alone and supreme in these five respects:

No other tire combats rim-cutting as they do.

No other tire gets the "On-Air" cure—a process which costs us $450,000 yearly—a process which saves the countless blowouts due to wrinkled fabric.

No other tire combats loose treads as we do. We've reduced this risk 60 per cent.

No other tire is held so firmly to the rim. In each tire base we vulcanize six flat bands of 126 braided wires.

No other tire has our All-Weather tread. It is tough and double-thick, so puncture is difficult. It has sharp, resistless grips. And those grips—flat, broad and deep—are immensely enduring.

GOODYEAR
AKRON, OHIO
No-Rim-Cut Tires
With All-Weather Treads or Smooth

20 Billion Miles

Goodyear tires have traveled close to 20 billion miles. Hundreds of thousands have used them. The place they hold after all that experience shows what these protections mean.

They mean the best average service. They are subject to misuse and mishap like any other tire. But they best avoid these major troubles because they are built to avoid them.

Yet these extra features involve no extra price. Our mammoth output saves us what those extras cost.

You owe yourself a trial of such tires—the tires that won top place. Any dealer will supply you.

THE GOODYEAR TIRE & RUBBER CO., AKRON, OHIO

(2179)

The GENEMOTOR

Built by the GENERAL ELECTRIC COMPANY for Starting and Lighting FORD Cars

$80

F. O. B. LYNN, MASS.

THE GENEMOTOR fits any one of the 600,000 Model T Ford cars now in use. It can be put on an old Ford or a new Ford. Any mechanic can apply it in a few hours.

It is built by the GENERAL ELECTRIC COMPANY.

The GENEMOTOR embodies new elements of electrical and mechanical construction, and represents the accumulated experience of the Engineers of the GENERAL ELECTRIC COMPANY in the design of small electrical machinery and appliances.

The first GENEMOTORS built were successfully subjected to the most severe and exhaustive tests to demonstrate their dependability in service before the design was approved or manufacture undertaken.

Through frigid cold and torrid heat, through rain and snow and all conditions of road or travel, the GENEMOTOR performs its service with certainty and efficiency.

Press the button and the generator will spin the Ford engine a minimum of 150 revolutions per minute. Those automobile men who have witnessed its operation say it is the best of the starting and lighting systems ever offered for Ford cars.

The enormous facilities for manufacture possessed by the GENERAL ELECTRIC COMPANY at its various plants is sufficient guarantee of any production required to meet the needs of the 600,000 owners of outstanding Ford cars, who may wish to equip with GENEMOTORS.

Price $80.00 f. o. b. Lynn, Mass., complete without lamps.

Dealers seeking territory should write us direct.

Deliveries begin February 15th.

Full technical data and catalog sent on request.

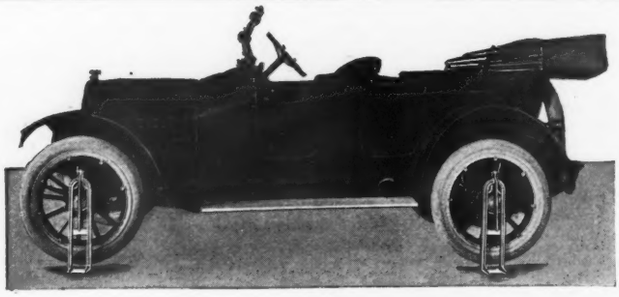
Sole Distributors

A. J. PICARD & COMPANY

1720-1722 Broadway, New York

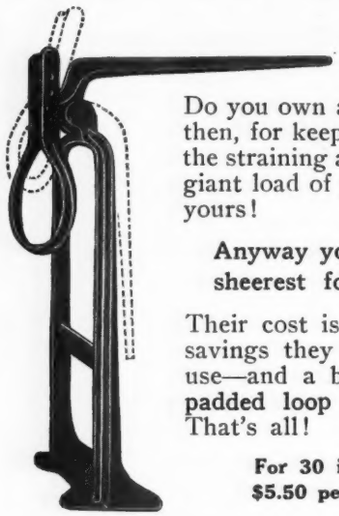
Exhibited at the Chicago Automobile Show, Space No. 22 Armory and at Congress Hotel

The Standard Tire Savers



Dealers: Write for Special Offer

The Surest Way to Cut Tire Costs:



DO YOU run your car every day? Then why not **rest your tires every night**—relieve them of the **life-robbing weight-strain** of your heavy car?

Do you own a big machine that you use only occasionally? More reason than ever, then, for keeping the tires up off the oily garage floor—and putting an instant stop to the straining and stretching of rubber and fabric which is always taking place when that giant load of your heavy car is being carried—**at one point**—by those costly tires of yours!

Anyway you figure it—it's sheerest folly not to use

Moore Tire-Saving Jacks

Their cost is nothing compared with the great savings they effect. They're always ready for use—and a boy can operate them easily. **Slip padded loop over hub and press down lever.** That's all!

Get your set today. They're great for winter storage—and big money-savers the whole year round. At your dealers—or sent direct on receipt of price.

For 30 inch Tires $5.50 per set of 4

For 32 to 35 inch Tires $6.50 per set of 4

For 37 to 42 inch Tires $7.50 per set of 4

BADGER AUTOMOBILE JACKS

Badger Truck Jack

Carried in stock by first-class dealers and jobbers everywhere

Look for the name.

If it's a Badger Jack **The quality is there**

Badger Adjustable Foot Lift Jack

Dealers:

Write today for Catalog and Discount Sheet

Badger Jack

THE new Badger Adjustable Foot Lift Jack is making a big hit with dealers and motorists everywhere. Where front and rear axles are of different height—where road conditions make an ordinary jack next to useless—and in many other instances—this sturdy Badger Adjustable Foot Lift Jack is "great medicine." See it at your dealers.

Walker-Moore Manufacturing Company

Makers of Tire Savers, Lifting Jacks and Ford Specialties

110 Wisconsin St., Racine, Wis.

MERCER

22-70 SERIES

Simplicity, Strength, Power, Speed, Light Weight, Economy, Riding Comfort, Perfect Streamline Body Styles, Thoroughness of Construction, and Marked Distinction in Every Detail—

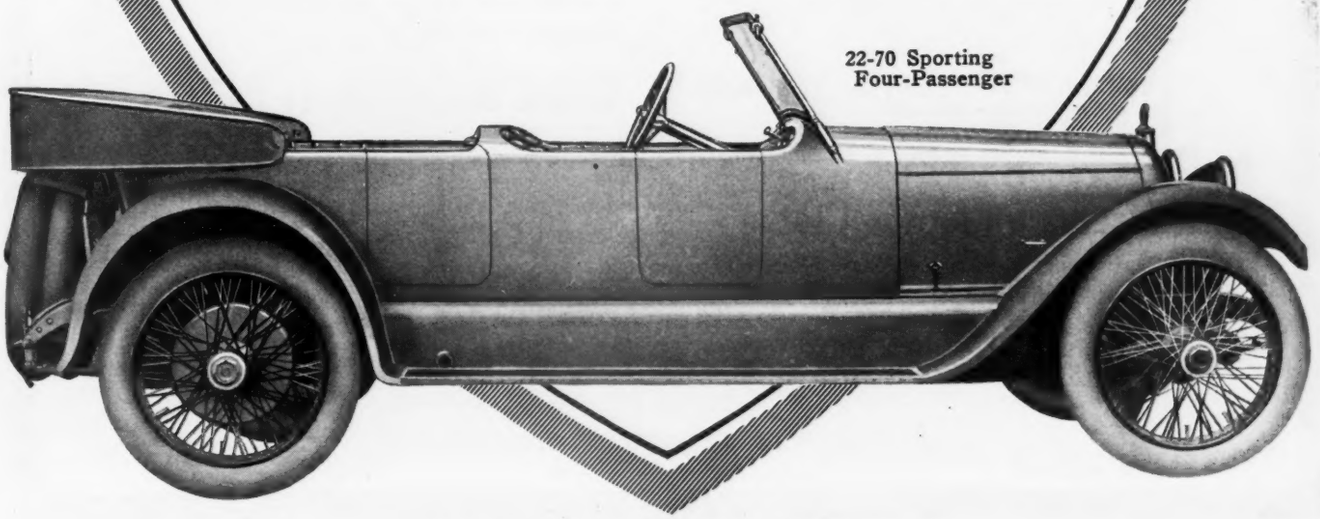
These are among the pre-eminent features which cause motor critics to pronounce the new 22-70 Mercer as the most advanced car of the year. The keynote of the entire car is a remarkably powerful and substantial four-cylinder chassis—motor rated at 22 h. p. but develops over 70. Word descriptions cannot properly tell the story of the stream-line bodies—they must be seen to be appreciated.

On Exhibition at Chicago Show — Coliseum

22-70 Sporting—Four-Passenger
22-70 Touring—Six-Passenger
22-70 Runabout 22-70 Raceabout

See them at Show or Send for Literature

MERCER AUTOMOBILE CO. 800 Whitehead Road TRENTON, N. J.

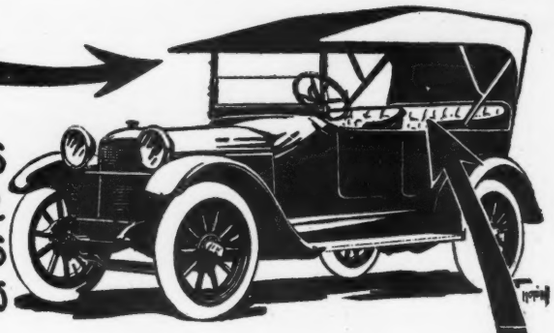


22-70 Sporting
Four-Passenger

Use

CHASE

AUTO FABRICS
LEATHER
MOTOR ROBES
DREDNAUT MOTOR CLOTHS



We Are Fabric Specialists

DREDNAUT TRADE MARK Motor Cloths

The Largest Manufacturers in This Line

There isn't any class of material made that is subjected to more severe service than the fabric used in automobile tops. In order to give satisfaction it must retain its appearance of newness permanently, without fading, stretching, rotting or losing its waterproof qualities, in spite of continuous exposure to sun, wind, rain, snow and dampness. None but the best can stand these conditions.

Chase Auto Top Fabrics Are Most Reliable

We are the largest and oldest manufacturers in the country engaged in this line. Every yard is made in our mills and we have the largest output of any manufacturer. With fifty years of manufacturing experience, we have specialized on the making of top fabrics for more than thirty years. No other maker is so well equipped to produce quality and reliability. No other maker has the facilities to compete with us in price, on fabrics of equal quality.

For Permanent Satisfaction, Specify Chase Fabrics

CHASE LEATHER
The finest substitute for genuine leather now on the market. Best in appearance, durability and wearing qualities. Our "Galloway," "Gibraltar," "Buckskin" and "Imperial" brands are especially popular in the automobile trade.

CHASE MOHAIR, LUSTRE TOP AND SLIP COVER CLOTHS
Unexcelled in quality—complete in assortment.

Drednaut Motor Cloths

Under this brand we market the finest rubber fabrics known in the trade.

CHASE MOTOR ROBES
The Chase Line of Motor Robes is unexcelled in assortment, variety and novelty of patterns and qualities. We have manufactured and sold more automobile and carriage robes than any other one organization in America.

Chase Mohair Body Fabrics

Something new and distinctive. Will wear a life time. You should know about these when considering your upholstering proposition.
Auto and Top Manufacturers: Write our nearest office for quotations and samples on your requirements.

L. C. CHASE & COMPANY, Detroit, St. Louis, Boston, New York, Chicago, San Francisco

CHICAGO SHOW HEADQUARTERS, AUDITORIUM ANNEX

The Miller Dreibund (*Triple Alliance*)

insures every Miller dealer a permanent, growing business and the most profit

THE dealer having the *exclusive sale* of a tire that gives the user the utmost in mileage, service, and satisfaction, is the dealer who makes the most profit, *provided* the tire he sells is nationally advertised and therefore easy to sell.

The Miller Dreibund *Triple Alliance* has taken dealers everywhere out of the "tire handling" class and put them into the "profit selling" class. It has put them on the map.

You, too, can put yourself on the map with

Miller GEARED TO THE ROAD Tires

The Miller Method of building tires is the net result of 23 years of rubber experience. The Miller Method doesn't cook the life out of the rubber in vulcanizing, but preserves all the rubber's native toughness. This means life in the tire and maximum strength for wear on the car.

The Miller Plan of selling tires (*one dealer in a town*) gives one dealer all the profit, not a slice of it. The Miller dealer owns his own tire trade, and gets all the profit from every Miller tire sold in his territory.

No tire dealer could afford to buy a page in the Saturday Evening Post, Collier's Weekly or the publications used to advertise Miller tires. But each Miller dealer gets the same effect, because the motorist in your town reading these advertisements, can buy Miller tires *only* from him. All the force back of this big magazine campaign works for you—it's not split up among a lot of dealers who sell a number of different makes of tires. The Miller dealer gets all the sales and all the profits.

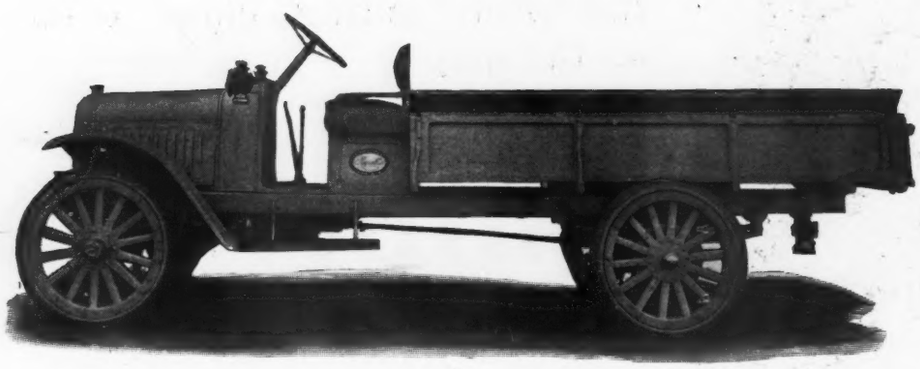
The Miller tire is the best tire for you, Mr. Dealer, to sell, because it's easily sold, stays sold, makes permanent, satisfied customers and gives you the most profit.

Think over what the exclusive agency of a quality tire like the Miller backed by national advertising means to you. If you are the best tire dealer in your town, write at once and get the details of the Miller plan before some other dealer gets the Miller agency in your town.

The Miller Rubber Co., *Akron, O.*

REPUBLIC FOR SERVICE
REPUBLIC MOTOR TRUCK @
ALMA, MICH.

Republic Trucks are Rapid Sellers



The New Republic Three-Quarter Ton Model

Featuring an internal gear drive rear axle. Furnished complete, as above, $995.

All REPUBLIC dealers know this to be the truth. So do their competitors, for they find it hard to make headway against REPUBLIC prestige, REPUBLIC value, and REPUBLIC performance.

The reason for REPUBLIC supremacy is not a mystery. It is an honest truck at an honest price. It is a quality truck having the best individual units obtainable, the right design, unsurpassed efficiency, proved economy, and unquestioned durability. It sells because it is the capacity with the right price to give owners the best results.

Three Capacities - - - Five Chasses

MODEL F	MODEL C	MODEL L	MODEL M	MODEL D
1500-lbs. capacity	2000-lbs. capacity	2000-lbs. capacity	3000-lbs. capacity	3000-lbs. capacity
124 in. wheelbase	124 in. wheelbase	144 in. wheelbase	124 in. wheelbase	144 in. wheelbase
35 x 3 front tires	35 x 3 front tires	35 x 3 front tires	35 x 3½ front tires	35 x 3½ front tires
35 x 3½ rear tires	35 x 4 rear tires	35 x 4 rear tires	35 x 5 rear tires	35 x 5 rear tires
$995 (Express Body)	**$1350 (Chassis)**	**$1350 (Chassis)**	**$1475 (Chassis)**	**$1475 (Chassis)**

The Recognized Standard in Motor Trucks of This Capacity

We desire high-class connections in all unoccupied territory

Republic Motor Truck Company

Alma, Michigan

The NATIONAL Advertising of 100% THERMOID

Thermoid Brake Lining is forcefully advertised in the strongest national publications.

The advertising is backed by quality that acknowledges no equal—no competition.

Note these mediums and circulations:

National		Automobile	
Saturday Evening Post	1,920,000	Motor Age	23,372
Collier's Weekly	804,069	Automobile	18,241
Literary Digest	328,000	Auto Topics	8,700
Scientific American	61,102	Horseless Age	12,000
Total	2,113,171	Auto Trade Journal	24,000
Miscellaneous		Auto Dealer and Repairer	32,000
Hardware Age	17,500	Total	118,313

Grand Total, 2,248,984

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

These two advantages—forceful advertising, matchless quality—spell commercial supremacy. When they are assured, wise merchants begin to stock up and take advantage of Opportunity.

Already automobile supply dealers throughout the land have found Thermoid a big source of profit, because of its wide popularity, the unfailing satisfaction it gives, the "repeat" business. Why not write us for details?

Briefly, the reliability of brakes rests entirely with their lining. It must be 100% in gripping power clear through—**not merely** on the outside.

Thermoid retains its 100% gripping power even until worn **paper-thin.** Hydraulic compression makes it one solid substance of uniform density clear through—instead of being loose and stringy (friction shy) on the inside, as is ordinary woven "brake-lining." Guard life with Thermoid.

For Details and Terms address

THERMOID RUBBER CO.

Trenton. N. J., U. S. A.

Our Guarantee: Thermoid will make good—or we will

CHELSEA

☞ For years, the recognized STANDARD OF EFFICIENCY.

☞ Over 100,000 in active use, many thousands for over ten years and giving excellent satisfaction today

FLANGE INSET
AND OTHER TYPES
AUTO
CLOCKS

Front Wind and Set **Back Wind and Set**
Side Wind and Set, and Key Wind

Catalogs on Request **CHELSEA CLOCK CO., 16 State Street, Boston, Mass., U. S. A.**

☞ **TO USERS**—With only reasonable care "CHELSEA" Autoclocks will last indefinitely and keep good time—Buy a "CHELSEA."

"BOSTON" 8-Day High Grade AUTO CLOCKS

Flush Insets, etc. Outside permanent Winding and Setting devices, etc.

Also the (Patented) ELECTRIC AUTO CLOCK

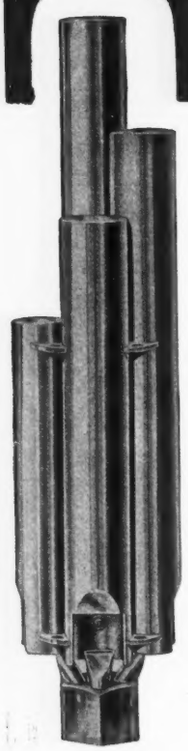
The latest up-to-date Accessory—You don't have to wind it

Catalogs on Request **BOSTON CLOCK COMPANY** 16 State Street, Boston, Mass., U. S. A.

☞ Thousands in use for many years AND good timekeepers now. **QUALITY—STYLE—PRICE.**

1915 A BIG YEAR

The "Eklips" Spark Plug



We have added to our products a complete line of strictly high grade spark plugs—the "EKLIPS"—made to fit all motors. Start the year right by equipping your motor with "EKLIPS" Plugs.

The "EKLIPS" SPARK PLUGS have been designed for all-around service. They have several features which will appeal to you. The materials and workmanship both are of the best. Made for all cars in porcelain or mica types.

THE AERMORE EXHAUST HORN is the horn with the musical sound. You can equip your car with this never-failing signal that amply warns but does not frighten for $5.50 to $7.50, according to size.

The AERMORE Exhaust Horn

If your local dealer does not carry either "EKLIPS" SPARK PLUGS or the AERMORE HORN, we will supply you direct if you fill out the coupon below. Descriptive printed matter gladly sent on request.

The Fulton Company
727-729 National Avenue
Milwaukee, Wis.

COUPON

The Fulton Co.,
727-729 National Avenue, Milwaukee, Wis.

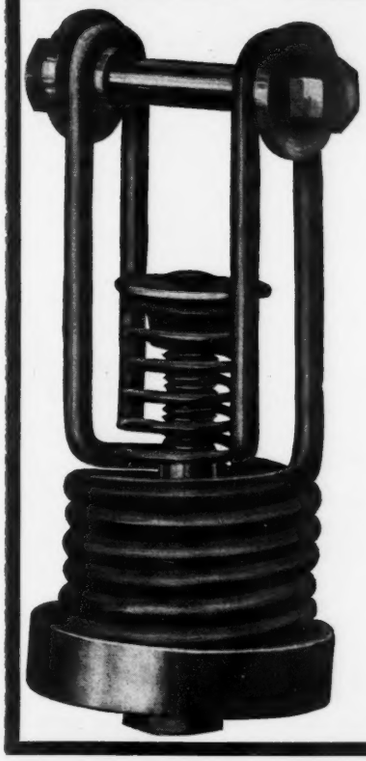
Please send me full description of "EKLIPS" Spark Plugs and the AERMORE HORNS.

Name.....

Address.....

Dealer.....

GET THIS! It's the Inside Truth About Shock Absorbers



There is only one coil spring shock absorber with a positive recoil check — a check that stops the rebound. There is only one shock absorber that's immediately abjustable to all road and load conditions and that's the

JOHNSON

"SHOCK ABSORBER"

"The Ultimate Shock Absorber"

Encased

Is it any wonder that it's the fastest selling shock absorber in the world—that 11,000 car owners in the city of Chicago alone, last year, equipped their cars with Johnsons. Same way the country over.

You, Mr. Dealer—Better get in line—handle the Shock Absorber of quick, easy sale—the one that your customers want— the one that will satisfy them. A letter brings our proposition.

See us at the Chicago Show, Sections 212-213 Coliseum Annex, Second Floor.

TRIPLE ACTION SPRING COMPANY

Established 1906

61-63-65 East 28th Street, Chicago

MAKE $250.00 A MONTH REPAIRING AUTOMOBILE TIRES

Sounds like a lot of money—IT IS—A WHOLE LOT of MONEY to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the DRAW BRIDGE for SUCCESS to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your PRODUCT or SERVICE constant and ever on the increase.

A Haywood Tire Repair Equipment

answers to all of these requirements of Old Dame Fortune—the certainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

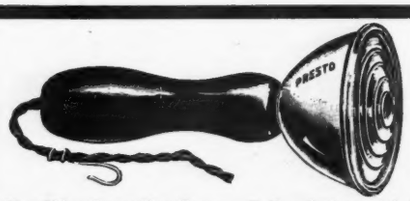
Here Is Your Opportunity!

Be first to enter this new, big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnston, Tex., writes: **"I have made as high as $18 in a day."** Another man who bought a plant September, 1911, writes he has **cleared over $3000.00.** That's going some! Operate a plant as a side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. **Auto owners**—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.

HAYWOOD TIRE & EQUIPMENT COMPANY 720 N. Capitol Avenue INDIANAPOLIS, INDIANA *The New Money-Making Business—Start Now*



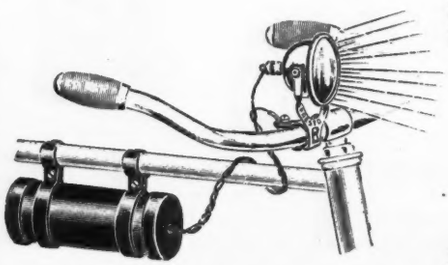
No. 286. Inspection Lamp. Full reflector, nickel-plated, highly polished, with 3-in. lens for reading street signs and house numbers from machine and all kinds of general repair work. Complete, 10-ft. cord, battery terminals, Bayonet lamp socket, 6-v., 4-c. p. tungsten bulb, **$1.25.**
No. 281. Without lens, **$1.00.**

No. 291. Inspection Lamp. Combination trouble lamp and searchlight, for reading at a distance. Powerful lamp bulb, bullseye lens. Convenient switch in handle. Heavy brass, nickel-plated. Complete with cord, battery terminals and 6-v., 6-c. p. Edi-Swan base bulb, **$2.25.**

All four articles shown are new this year

Every motorist "on the safe side" carries **"PRESTO" Specialties** in his machine, for convenience, and in case of emergency. Our models care for every driver's needs. The "PRESTO" line is complete and guaranteed for service. Always the latest. Our new bicycle electric headlight is the newest convenience for riders.

DEALERS—Add the "PRESTO" line of 57 different articles to your catalog. **Every electrical convenience that motorists buy—dash and hand lamps, cigar lighters, Anchor Bayonet Lamp sockets and connections, etc.—finishing touches that count.** Write for our liberal proposition to dealers.



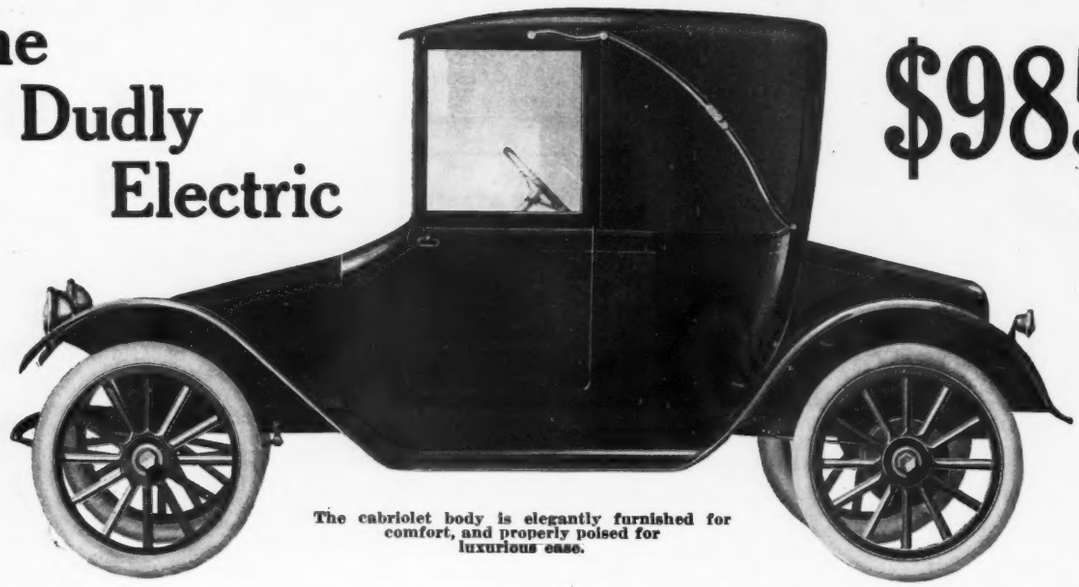
No. 1050. Bicycle Headlight. A convenient and adjustable headlight for bicyclists. Made to fit any handle bars. Tungsten bulb. Bullseye lens. With can, brackets and holder—ready for connection to bicycle (without battery), **$1.50.**

No. 1000. "Presto" Electric Hand Lamp. An attachment for any dry cell battery. Will stand or hang anywhere. Reflector can be moved to any angle. Equipped with tungsten bulb and 2-in. bullseye lens. Attachment complete with battery, **$1.25.** Without battery, **$1.00.**

LIBERAL DISCOUNTS

Metal Specialties Mfg. Company
730-38 W. Monroe Street, Chicago, Illinois
Western Branch.....604 Mission St., San Francisco
Eastern Branch.....1779 Broadway, New York City

The Dudly Electric $985



The cabriolet body is elegantly furnished for comfort, and properly poised for luxurious ease.

The only electric car listed below $1000. Standard in every detail of comfort, beauty and mechanism.

Note These Quality Specifications:

Wheelbase, 100"; tread, 56"; wheels, wood—artillery type; tires, 30x3½, pneumatic; frame, pressed channel steel; steering gear, wheel; brakes, 2 foot, on rear wheel brake drums; springs—front, semi-elliptic; rear, cantilever; battery, 14-cell Exide; motor, series wound, slow speed, 1½ H. P.; controller, 3 speeds forward and reverse, located on steering wheel; drive, worm gear; mileage capacity, 45 to 50 miles per charge; body, coupelet; price, $985.

Dealers Wanted. February Delivery

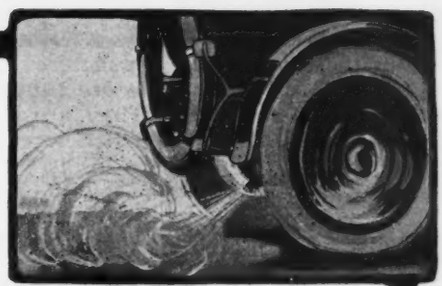
THE DUDLY TOOL COMPANY, Menominee, Michigan

GABRIEL HORN MFG. CO.
1415 E. 40th ST., CLEVELAND, OHIO

Why subject your car to wear and tear, and its occupants to discomfort by having to slow down at every rough place like this—when you could ride over them in comfort without slackening speed, if your car had **?**

GABRIEL SNUBBERS

Are You Heating the Boulevards or Your Automobile?



Are you wasting heat where it isn't needed, while you and your party sit just above and suffer from the cold? You could harness that heat—and use it—with a

Bailey Auto Heater

—to keep your car at parlor temperature. A valve in the exhaust line, some flexible tubing, and a special heater—protected by a grilled nickel-plated register, flush with the floor—comprise the BAILEY HEATER.

Registers in front and rear seat—noiseless, odorless, safe—keep your car at a livable temperature, without a "stuffy" atmosphere.

The BAILEY may be readily installed by anyone, on any car. In less than five minutes more, it will radiate comfort for both driver and passengers. Adapted to open and closed cars.

In ordering state outside measurement of exhaust pipe and make and model of car. Complete instructions for installation come with the BAILEY. Price, complete, $20.

LIVE DEALERS WRITE

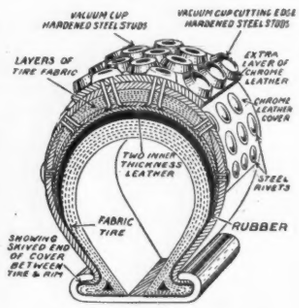
BAILEY AUTO HEATER COMPANY, 228-232 W. Croton Ave., New Castle, Pa.

10,000 MILES
GUARANTEE BACKS THIS TIRE

Brictson
Pneumatic Tires

Try Them at Our Expense

TRY Brictson Pneumatic Tires at our expense. Don't pay until you are satisfied. At our risk find out for yourself what wonderful service Brictson Tires give—how resilient and easy riding they are. Get rid of punctures, blowouts and rim cuts. Brictson Tires are rut proof, oil proof and gasoline proof. They are sold under a specific 10,000-mile written service guarantee.


VACUUM CUP HARDENED STEEL STUDS
VACUUM CUP CUTTING EDGE HARDENED STEEL STUDS
LAYERS OF TIRE FABRIC
EXTRA LAYER OF CHROME LEATHER
CHROME LEATHER COVER
TWO INNER THICKNESS LEATHER
STEEL RIVETS
FABRIC TIRE
RUBBER
SHOWING SKIVED END OF COVER BETWEEN TIRE & RIM

Your Tires Rebuilt the Brictson Way

If the fabric in the tires you are now using is in good condition, we can take them, make them proof against rim-cutting, punctures, blowouts, side wall breaks, skidding, ruts, oil, and give thousands of miles additional service.

Sign and send back coupon for full information and details of our liberal Free Trial Plan

THE BRICTSON MFG. COMPANY
1215 Brictson Building **BROOKINGS, SO. DAK.**

Mail Back This Coupon

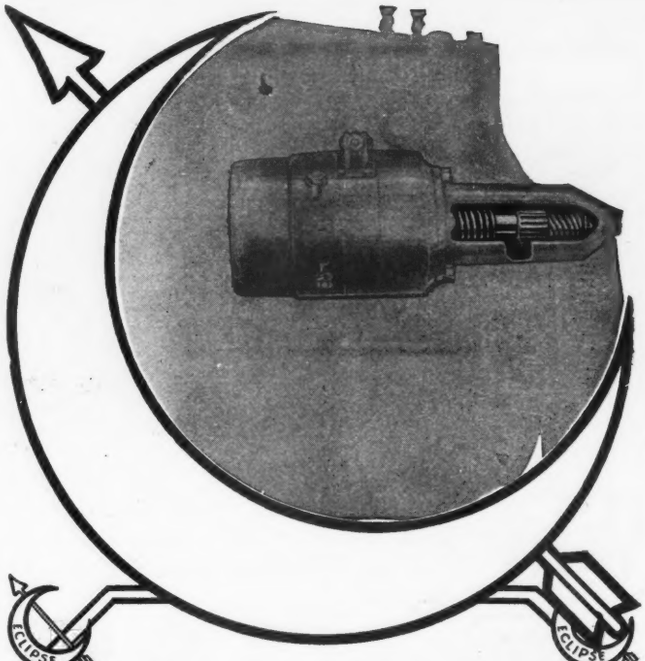
Brictson Mfg. Co., 1215 *Brictson Bldg., Brookings, So. Dak.*

Please send me full particulars about Brictson Tires, explain your free trial plan, also explain how my own tires can be rebuilt the Brictson Way.

Size of Tires_____

Name_____

Address _____



Eclipse-Bendix

AUTOMATIC GEAR TRANSMISSION

for Electric Starters

The ECLIPSE-BENDIX operates from a push button; does away with levers, resistance switches or over-running clutches; starts the engine with stored force; and costs about one-fourth as much as an ordinary starting gear. It is simple, strong, foolproof, and absolutely automatic.

We are glad to supply detailed information and drawings for adapting the ECLIPSE-BENDIX to any type of automobile motor or electric starter.

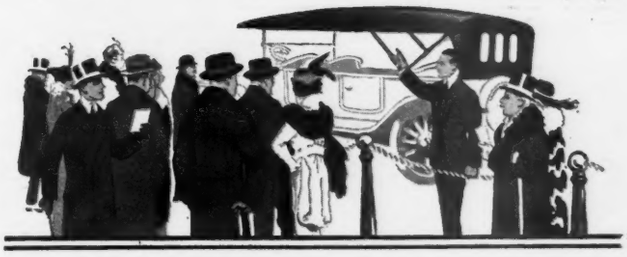
Manufactured by

ECLIPSE MACHINE CO., Elmira, N. Y.

General Sales Agents

BRANDENBURG & CO.

New York.....57th and Broadway
Chicago.....1112 So. Michigan Avenue
Detroit.....Ford Building



A TOP material that leaks is EXASPERATING; a Top material that gets shabby is HUMILIATING—in fact any kind of a Top material except one that *protects* and wears, you would classify as so much RUBBISH.

AT THE SHOW

Ask the Automobile Salesmen these questions:

1. What Top material is used on your car?

If it's genuine

Pantasote

you are getting the greatest possible value

If it is *not* genuine Pantasote—then—

2. Ask if it has a direct-to-owner guarantee backed by an old established Company whose responsibility and quality of product are *known?*.
3. Ask the salesman *who makes it?* Get the *NAME.*
4. Ask him what his Top material is made of?
5. Ask whether it is guaranteed against injury by oil and grease?
6. Ask if strong sunlight and extreme temperatures and climatic conditions affect it?
7. Ask the salesman if it is *permanently waterproof?*
8. Ask if dirt and dust can be removed without the use of a ruinous cleaning liquid?

As a matter of fact—Pantasote is the one Top material which has not become a victim of wild competition, which invariably means price-cutting, and, more important, *quality-cutting.*

Genuine Pantasote is used on quality-cars (such as the Pierce-Arrow, Marmon, Stevens Duryea, Hudson, Cole, Chandler, etc.) because its first cost is justified by the *service* which the owner gets out of his Top. It not only gives him the greatest *mileage* —but it keeps looking fresh and new during its entire length of service.

CAUTION—In purchasing an automobile Top look for this label. It's your safest protection. There are cheap surface coated Top materials which look like Pantasote (but only when they are new). Substitution is frequently practised by unscrupulous dealers to increase their profits at the purchaser's expense. Labels like this are sent out free with every shipment of Pantasote. The Top maker has no excuse for not using them on Pantasote Tops.

"What's What in Top Materials" is a 24-page treatise on the general subject of Top materials. It is sent without charge on request and gives you an insight into the Top material question which does not show on the surface.

Every Top looks well when it's new—there are a number of reasons why Pantasote keeps looking new after it has actually been "on the road." Send for this booklet today.

THE PANTASOTE COMPANY
62 Bowling Green Building New York, N. Y.

If You Were Worn Out—

—from hand pumping tires; if your good disposition was all pumped out, and you hated your machine for a nuisance; if right then a

MAYO SPARK PLUG PUMP

—salesman offered you a MAYO pump for $10—you'd buy it quick!

Why not buy your MAYO *now*—before you tax your strength and temper with useless hand pumping?

The MAYO pumps clean, pure air only. Substituted for any spark plug. Built with rings, like your motor, and lasts as long. Complete with 12 ft. hose, gauge and all connections, $10.

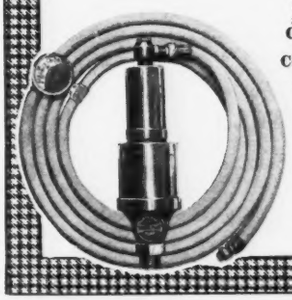
The Lowest Priced Quality Power Pump

Special Ford Pump complete with gauge and all connections, $8. MAYO Valve Cap pump for permanent motor attachment, $15.

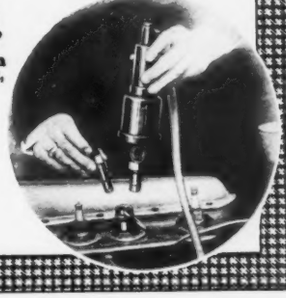
Try One Free on Your Car for 30 Days

Dealers—Get out after the many men who want MAYOS. Discounts are liberal. Write.

MAYO MFG. COMPANY
55 E. 18th St. Chicago



See us at the Chicago Show, Coliseum Annex, Space 184.



To Owners of Pope-Hartford Cars and Trucks

WE have acquired all of the original drawings, tracings, patterns, tools, dies and fixtures as well as the entire stock of finished and unfinished parts of Pope-Hartford Pleasure Cars, Trucks and Fire Apparatus, and will continue to manufacture, from the original drawings and specifications, parts for all models of Pope-Hartford Pleasure Cars, Trucks and Fire Apparatus.

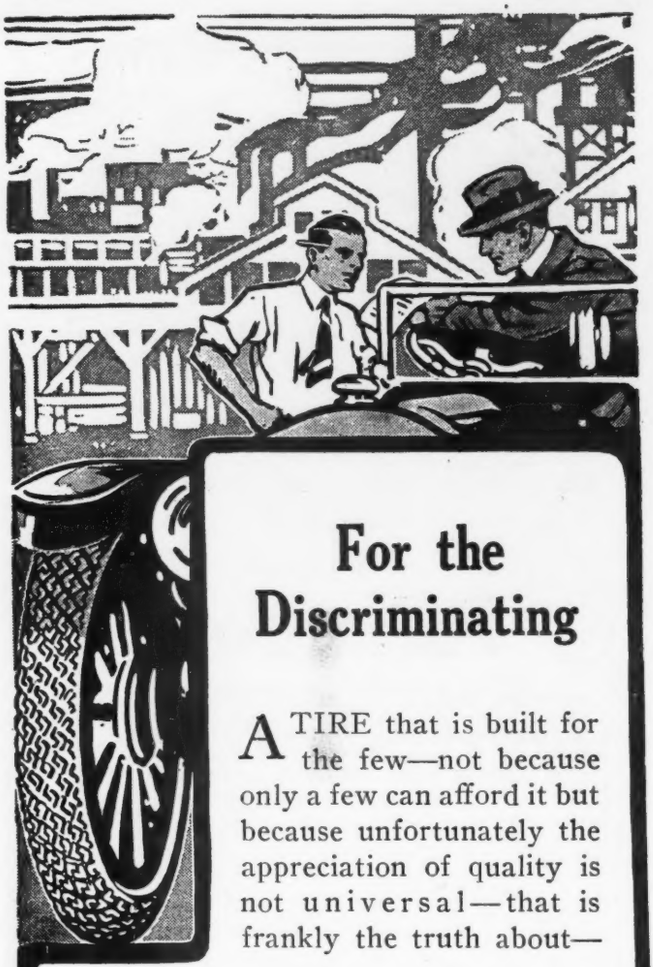
We are prepared to supply every part from the smallest bolt to a complete frame or motor, of any model, made from the original drawings, with the same special tools and by workmen trained in the Pope Shops.

The safety and service of your car depends on the quality of material used in each individual part. What may look like an ordinary bolt, which might be perfectly satisfactory when used in the construction of a horse-drawn vehicle, may not have a sufficient margin of safety when used in an automobile. To insure getting Pope-Hartford parts built of the proper material, order your Pope-Hartford parts from our nearest dealer or direct from us.

If your nearest dealer is not able to supply any part of your car which you may require promptly, wire, telephone or write us and we will supply it direct.

The Hartford Motor Car Co.
436 Capitol Avenue Hartford, Conn.

We offer for sale
POPE-HARTFORD
3 Ton and 5 Ton Truck Chassis
GUARANTEED
Offered at prices representing UNPARALLELED commercial car VALUE



For the Discriminating

A TIRE that is built for the few—not because only a few can afford it but because unfortunately the appreciation of quality is not universal—that is frankly the truth about—

SPEED MARATHON ENDURANCE
TIRES

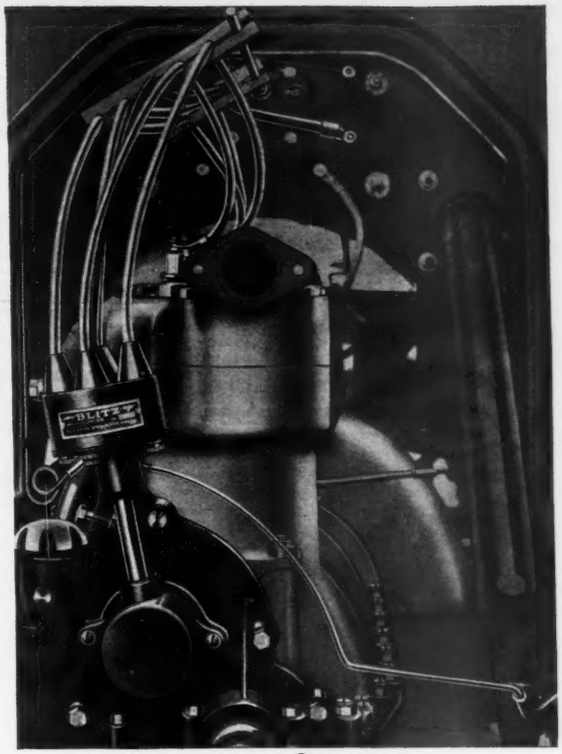
Cheaper tires are made, we know— Better tires can't be.

Marathon Tires will not sell to everybody—but they will sell to a very definite and desirable class of car owners who have an instinctive liking for real quality, the discriminating.

The dealer who sells Marathon Tires puts himself in better position to get and hold the tire trade—and other trade—of the car owner who does not buy on a price basis.

There is profit for the dealer in Marathon Tires—and the trade he builds he holds. Write for more facts about Marathon Tires and terms.

The Marathon Tire & Rubber Co.
CUYAHOGA FALLS, OHIO



A Highly Efficient Ford Ignition System

—is essential to the economy and satisfactory driving of your Ford car. The cranking away of hours every year—because of the lack of an effective ignition system—is a waste of valuable time and energy that you could save to advantage, with a—

BLITZ IGNITION SYSTEM

—built to give high-priced efficiency, at a cost in proportion to the value of your Ford.

The BLITZ Ignition System starts easily on magneto current, without batteries. It requires for operation, but one coil, one interrupter and one adjustment.

By correct timing of ignition BLITZ assures maximum mileage per gallon of gasoline, and minimum carbon deposits.

BLITZ prevents sticking of platinum points, burnt out timers, missing and back-firing. It insures uniform spark, perfect timing, easier starting and smoother running. Increases power. Installed without machine work or extra parts.

Price Complete, $15.00

Ask your dealer for BLITZ, or write direct to us.

DEALERS—BLITZ Ignition System is a time, fuel, and repair saver. Your customers will want it. Get liberal dealers' proposition.

See us at the Chicago Show

Electrical Specialties Mfg. Co.

1120 North 22nd Street OMAHA, NEB.

THE WALKER VEHICLE COMPANY

has purchased the factory and business of the Chicago Electric Motor Car Company and will continue the manufacture and sale of

CHICAGO ELECTRICS

This transaction was completed too late to obtain desirable space in the Annual National Automobile Show to be given in Chicago, January 23rd to 30th, 1915. For that reason we will exhibit

The Complete Line of 1915 Chicago Electric Models

The Latest Model Walker ELECTRIC TRUCKS

At Our General Sales Rooms 2700 Michigan Avenue, Chicago

Conveniently located but 10 minutes' ride from the "Coliseum"

This exhibit will continue throughout the Automobile Show week. This Company will have an office with representatives present, at the show, to be found in the Commercial Vehicle headquarters.

This complete line of electric cars, passenger and commercial, represents the highest known standards of electric car construction.

This line offers without question the most desirable opportunities to wide-awake-live dealers. We cordially invite you to visit our exhibit where much of interest awaits you.

Allotment of dealers' territories will be made at this time for the coming year.

THE WALKER VEHICLE COMPANY

Sales Rooms 2700 Michigan Ave. Factory 531-545 W. 39th St.

Chicago

Harness Your Motor to Your Lights

If the uneven quality of your lights is playing havoc with your night driving—

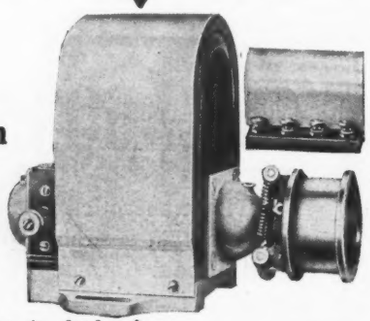
If your storage battery is always running low, when most needed—

If you are still the slave of old-fashioned gas or oil lighting—

Just harness your motor with a

TECO

TECO
Electric Lighting System



—and drive, hereafter, in the unwavering "great white way" of headlights operated from a storage battery that is always charged.

The TECO operates whenever your motor runs. An automatic electric cut-out prevents over-charging, or discharging when motor is dead. TECO has current output of 7 amperes at 10 volts.

For every automobile — especially Fords—and all motor boats.

Write for our catalog of lighting systems and accessories.

Price $20

Dealers and Jobbers—TECO is a high grade line of electric accessories that sell. Best lighting system. Good profits. Write.

The Tritt Electric Co., Union City, Ind.

LA Steady Steerer
FOR FORD CARS

MAKE YOUR FORD WALK the CHALKLINE

Would you give $2.00 to make your Ford "hold the road" at high speed? To keep your Ford from acting as though it wanted to take to the sidewalk when you turn a corner? To make your Ford steer easy over rough roads? The L-A Steady Steerer completely overcomes these conditions. It is a small, inconspicuous strut or radius rod, connected between the body and axle in such a way as to eliminate all body side-sway—the cause of the trouble. If the L-A Steady Steerer is not obtainable at your dealers, send $2.00 and receive one direct from the factory.
Dealers—write for prices at once Every Ford owner is a sure buyer.

LOCKWOOD-ASH MOTOR COMPANY
Horton Street, Jackson, Michigan

Any Ford owner
Using a Set of

TRADE K-W MARK **Road** Reg. U. S. Pat. Off. **Smoothers**

Quickly Applied to Your Ford Car

$15 Set of 4 1 for Each Wheel

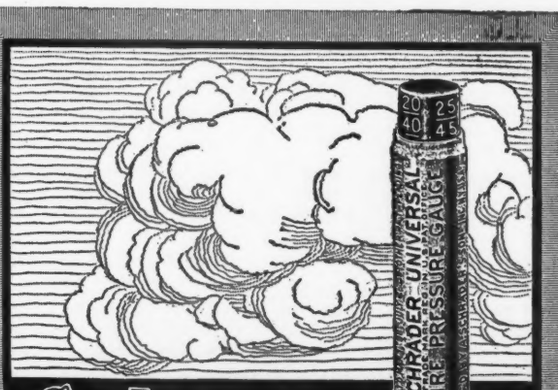
will tell you that they smooth out the roughest roads, and save wear and tear on both his car and tires. He will tell you that they need no attention and will stand the gaff of the roughest, rutty roads.

The reasons for this are—K-W Road Smoothers combine the three essential features necessary for long, lasting service, and your comfort. The helical spring takes up the shock; the air-chamber checks rebound, and the anti-side-motion links prevent side-rocking.

Every K-W Road Smoother is thoroughly tested and perfectly built, and of these materials: High-grade heat-treated drop forgings; electric smelted chrome vanadium steel springs, and extra heavy phosphor bronze bushings thruout.

K-W Road Smoothers are sold by dealers who know the difference, everywhere. If your dealer cannot supply you, sent direct on receipt of price. Write for booklet, "Taking Out the Bumps."

HEADLIGHTING OUTFITS — THE K-W IGNITION Co 2835 Chester Ave CLEVELAND, OHIO, U.S.A. — SPARK COILS SPARK PLUGS



Schrader

A TIRE begins to overwork and overwear the minute the air pressure in it falls short of the inflation prescribed for it by its makers. There is no method yet discovered of ascertaining the pressure in the inside of a tire except by the use of a pressure gauge. A casing containing 40 lbs. of air looks and feels *exactly* like a casing containing 80 lbs. If your tires require 80 lbs. and you only give them 40, they're on the quick road to the scrap heap.

USE A
SCHRADER
UNIVERSAL TIRE PRESSURE GAUGE
and save your tires
PRICE $1.00

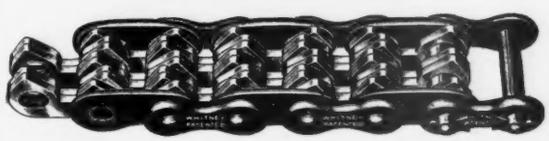
For sale by Tire Manufacturers, Jobbers, Dealers, Garages, or
A. SCHRADER'S SON, Inc.
783-791 Atlantic Ave. Brooklyn, N. Y.

CULLMAN Sprockets

for Block Roller and High-Speed Silent Chains

Chains and sprockets carried in stock

New Catalog!



Cullman Wheel Company

1340 Altgeld Street, Chicago

EUREKA

Electric Lighting Outfits

$20 TO $50

Most Satisfactory Lighting Equipment for Fords, Buicks, Maxwells, and other Cars

The **EUREKA** is specially designed for small car use. It offers many exclusive features particularly adapted to small car requirements.

It is exceedingly economical, generating more current at less expense than any other similar device on the market. It is absolutely trouble proof; the outfit is self-contained and needs no adjustment.

It is in no particular an experiment. It has built into it the seasoned experience of engineers who have been in the ignition business for over 16 years.

Ball Bearings Throughout

PERMANENT SATISFACTION GUARANTEED

Easy to attach—special fittings make installation as simple as A, B, C.

The **EUREKA** comes ready for immediate use. Don't put up with the inconveniences of gas lighting any longer. Get an **EUREKA today.**

DEALERS: We have an attractive proposition to submit to you. It is a sure profit maker. Write for it.

SEE OUR EXHIBIT AT SHOWS

HENRICKS NOVELTY CO.
1523 St. Paul St. Indianapolis, Ind.
EASTERN OFFICE: 136 Liberty St., N. Y.

A GOOD BUY

Two Vulcanizers in One for Less Than the Price of One

The Two-In-One Steam Vulcanizer

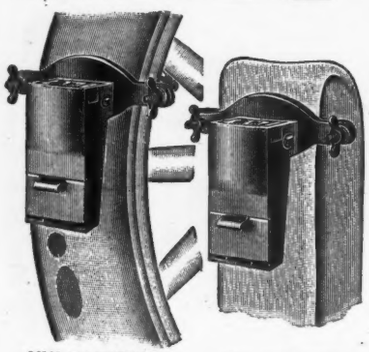
FOR BOTH CASINGS AND TUBES

No automobile completely equipped without this outfit.

NOTE THESE FACTS

- Requires no gauges or thermometers.
- Simple in Operation.
- A child can use it.
- Cuts in casings repaired without deflating.
- Adds hundreds of miles to the life of tires.
- Impossible to burn or scorch the rubber.
- First tire saved, repays you many times the cost.
- Concave surface designed to fit all size tires.
- Enclosed flame conforming with insurance regulations.
- Permits its use with safety in the garage.

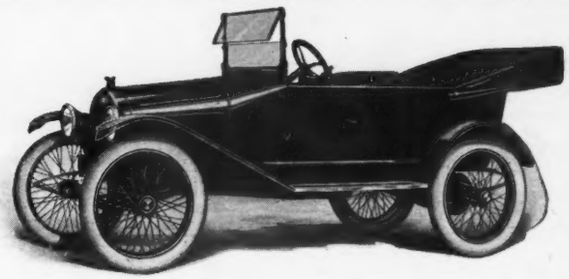
Jobbers and **Dealers:**—write for our liberal quotations.



VULCANIZING CASING — VULCANIZING INNER TUBE

Price Complete, $2.50
Including repair gum

The Lazarus Mfg. Co.
746 Euclid Ave.
Cleveland, O.



METZ "25"

The Quality Car

THE man who is looking for a strictly first class car with complete, up-to-date equipment, knows he has **found what he wants** when you show him this new Metz Touring Model, and tell him the price—

$600

Including Electric Starter and Electric Lights as Regular Equipment

Gray & Davis system, rain-vision built-in wind shield, instant one-man top, heavy tufted upholstery, deep cushions, 32" wheels, 3½" Goodrich clincher tires, Bosch magneto, Hyatt roller bearings, built-in gasoline gauge, speedometer, signal horn, tools, etc.

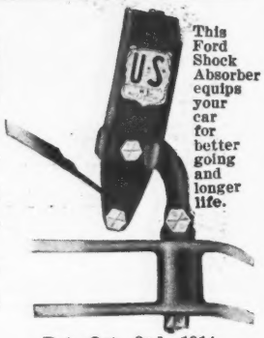
We want to hear from Dealers

Write for particulars and New Catalog "K"

METZ COMPANY, WALTHAM, MASS.

HERE IT IS!

The greatest Shock Absorber ever made, sold at the right price and easily attached by the car owner. These cardinal points make the value:



This Ford Shock Absorber equips your car for better going and longer life.

Pat. Oct. 2nd, 1914

The four corner bolts keep the spring aligned; whatever way the sway comes, the spring must give a straight pull.

Spring is enclosed dust-, grit- and water-proof in a glove-smooth housing packed with grease.

The sliding cam acts like a wrist of steel; gives to every sway yet holds firmly.

Designed to take care of the real problem of protection against shocks.

Pat. Oct. 2, 1914

JUST LOOK AT THE PRICES!

For Ford.....$11 per set of four
Cars up to 2600 lbs.....$16 per set of two
2700 lbs. and up.....$18 per set of two

Dealers, by carrying a small stock of the U. S. Absorbers, together with extra springs, can supply the demand of any weight car at a moment's notice.

MANUFACTURED BY

B. & L. Auto Lamp Co.

507-509 W. 35th St., NEW YORK, N. Y.

For Leaky Cylinders

Superior to All Others

PATENTED AUGUST 6, 1912

A Piston Ring Which Gives Compression in "Out-of-Round" Cylinders as Perfectly as in True Ones

Beware the "Just as good." Don't be fooled by imitators.

Here is a piston ring that gives 100% efficiency to every type of motor, engine, compressor or pump.

Ideally adapted to use in Automobile and Motorboat engines.

Gives compression when all others fail. No need to rebore worn cylinders—simply install EVER-TIGHT piston rings and the motor is good as new.

EVER-TIGHT piston rings are made up of three individual, interlocking rings, grooved together to give flexibility and reduce friction. This three-part construction is clearly seen in illustrations above. This is the only three-piece piston ring on the market.

If dealers do not carry EVER-TIGHT piston rings, Auto repair men should write us.

Jobbers and dealers wanted everywhere. Write for particulars.

THE EVER-TIGHT PISTON RING CO.

1416 CHESTNUT STREET ST. LOUIS, MO.

1915

J. & B.

SPECIAL FORD MASTER VIBRATOR

The best at any price. The Master of Master Vibrators.

Equipped with the famous J. & B. indestructible points.

ORDER FROM YOUR JOBBER OR DEALER

Guaranteed for Life

$8

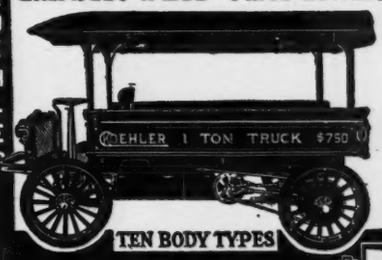
Complete with all fittings.

J. & B. MFG. CO. Pittsfield, Mass.

New York Branch 1777 Broadway | Chicago Branch N. A. Barrett 910 Michigan Ave. | Boston Branch J. J. Kelleher Co. 22 Trescott St.

KOEHLER ONE TON TRUCK $750

GREATEST VALUE AT THE PRICE · LOWEST PRICE FOR CAPACITY



Here are brief specifications: Motor 24 h. p. Water Cooled, 4 Cycle, Ignition, High Tension magneto, Tires 36 in., solid standard removable, also Non-Skid Demountable Pneumatic Tires Optional at extra price. Tread 58 inches, Axles 2 inches square, rear 1¼ inch front, Transmission proved right by years of use, runs in oil bath.

TEN BODY TYPES

KOEHLER $750 ONE TON TRUCK

SEND FOR CATALOGUE

DEALERS How about your city or town—is it Koehlerized, or waiting for someone to reap a harvest from sales? Will it be you, or one of your competitors, who will make it hard for anyone else to sell any other make of truck? The Koehler is a great money-maker for dealers, being the lowest priced ton truck and giving greatest value at any price.

Another Koehler Model that looks twice the price

OUR TRAVELING REPRESENTATIVES ARE NOW COVERING THE ENTIRE COUNTRY and each has a truck with him. Notify us at once if you are interested, as a representative may now be in your section. You do not want to miss a chance to see this truck. Our complete catalog and selling plan should be in your hands—send for these.

H. J. KOEHLER S. G. CO., 291 Halsey St. NEWARK, N. J.

KOEHLER ONE TON TRUCK $750

St. Louis Battery Charger

Simple and Robust Guaranteed

Six-volt, 6 ampere size
Type 1M
With meter $24

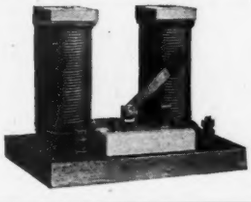
Type 1M
Without meter....$20

Larger sizes described in our catalog.

WRITE FOR IT AND DISCOUNTS

ST. LOUIS ELECTRICAL WORKS

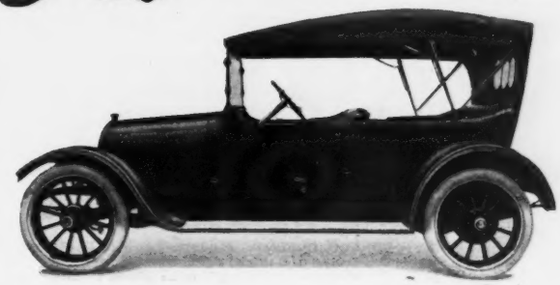
Arlington & Easton Ave. ST. LOUIS, MO.



ST. LOUIS MAGNETIZER
$7.50

Recharges all kinds of magnets to original strength from a 6-volt battery.

Halladay Light SIX



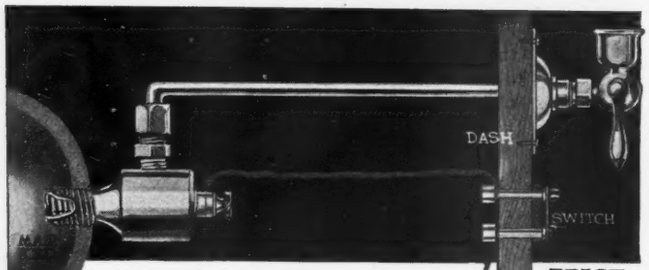
Mr. Dealer:—

Don't fail to see this car during Automobile Show in Chicago.

A handsome, high-grade light Six that will be easy to sell at $1385. Has famous Rutenber motor and Westinghouse system. Standard parts throughout. We've planned for big production and want agents everywhere. We have a splendid proposition to offer you and know you will admit that this will be a profitable line to handle this season.

See us at 1532 Michigan Ave. Alley entrance half way between Coliseum and Armory. If you don't attend the Show, write us at once for full particulars.

BARLEY MFG. CO. NOT INC. **Streator, Ill.**



For An Easy Start With a Cold Motor

PRICE $5.00

Any morning nowadays it's a case of cold motor and crank, crank, crank, and prime, prime, prime before it gets away.

Eliminate your starting troubles NOW. Equip your car with an

Ieco
MANIFOLD PLUG

This inexpensive little device will enable you to start your motor on the coldest day as easily as on a warm summer day. We say it will. Your money back if it don't.

The principle is simple. A few drops of gasoline into the priming cup **on the dash.** No lifting the hood, mind you. Then turn the motor over and bing! away she goes.

The priming charge has passed through the manifold plug which contains an **electrically heated coil** and has entered the cylinders perfectly vaporized, ready to explode at the first spark.

Another thing: it admits auxiliary air to the manifold at higher speeds resulting in 20% to 30% increased mileage per gallon of gasoline.

Can also be used to introduce kerosene into the cylinders in order to clear them of carbon.

Easy to attach if you follow our simple instructions. Dealers wanted everywhere.

Interstate Electric Company
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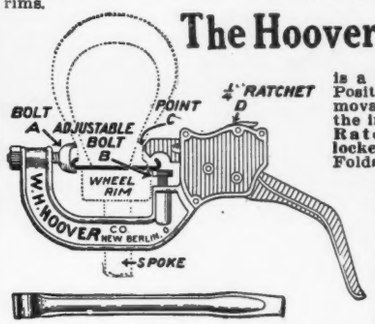
This Powerful and Handy Special Tool

may be used in the dark for removing quick detachable and clincher rims.

The Hoover Rim Remover



is a tool that cannot go wrong. Positive action — once set, the movable jaw will always engage the inner rim.

Ratchet holds rim remover locked, leaving both hands free. Folds up for the tool box. A handy tire tool is included. Price $1.25: No. 1, for 3 to 4 in. rims; No. 2, for 4½ to 6 in. rims. Write for discounts to dealers.

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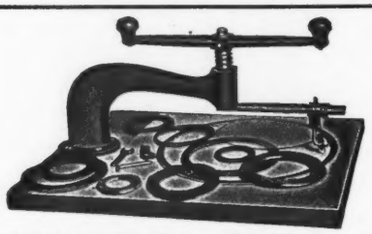
This is merely one of our auto necessities. Write for 1915 catalogue.

If your dealer cannot supply you, sent postpaid on receipt of price



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Capacity any size circle from 0 to 14"

Positive Measuring Scale to determine sizes

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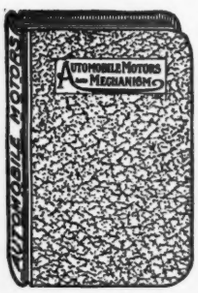

CONTENTS.

The Internal Combustion Engine—Principles and construction—Production of the fuel mixture—Function of the carbureter—The cycle of operations—Cylinders, piston and rings—Shafts and bearings—Ignition apparatus—Single and multi-cylinder engines—The two cycle engine—Valves and their functions—Silencing the exhaust—Engine hints and tips—**A typical modern motor**—Detailed description of construction—**Governing and Governors**—The centrifugal governor—Throttle valves—Governing and control—The hit-or-miss governor—**Carbureters**—The float-feed principle—The float chamber and jet—Various types of modern construction—Quality of mixture—Flooding the carbureter—Carbureter troubles and adjustments, etc.—**Transmission Mechanism—The Clutch**—Various forms in use—Positive and friction clutches—Plate or disk clutches—The combined disk and cone type—Expanding clutches—Clutch troubles, etc.—**Gear or Gearing**—Belt and chain gearing—Friction gear—Spur or tooth gearing—Spiral, helical, worm and bevel gearing—Epicyclic gear—Infinitely variable gear—**Differential or Balance Gear**—Its functions—**Shafts and Their Functions**—The crankshaft, half-speed shaft, countershaft, etc.—**Lubrication and Lubricators**—**Pumps and Their Purposes**—**Motor Misfiring, Causes and Remedies**—**Noises in the Motor, Causes and Remedies**—**Motor Overheating, Causes and Remedies**—**Electric Motors**—Principles and operation—**Steam Cars**—The engine, generator, reverse gear, etc.

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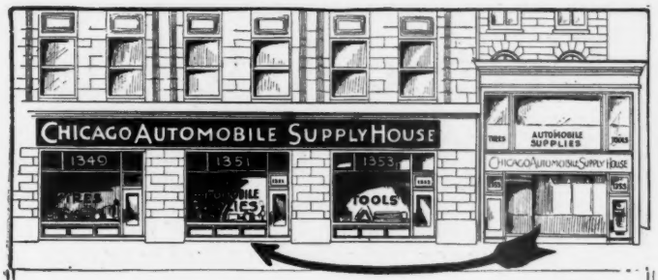

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See the new enclosed Ford cars

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TIRE PUMPS

Are easy to use and easy to sell. They are durable and efficient and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The "Stapley," the "Aeolus," "Windjammer," etc., give lasting satisfaction. Carry them in stock.

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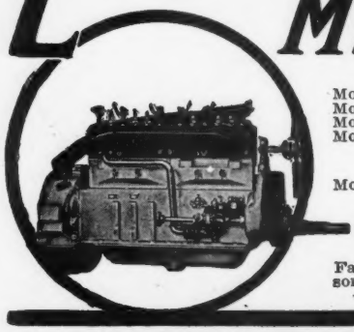

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Model U, 2¾x4	Model C, 4⅛x5¼
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SIXES

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Continental Motor Mfg. Co.

Detroit, Michigan

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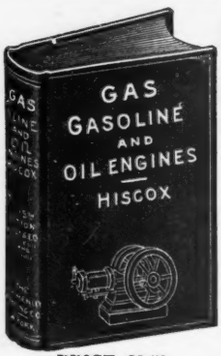

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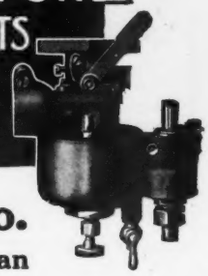

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the means to determine promptly the exact condition of the electrical equipment of any automobile.

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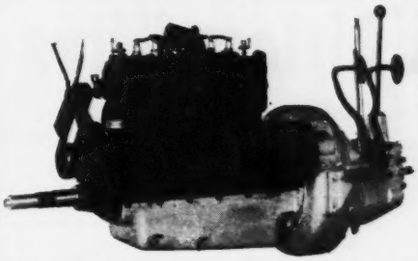

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Sizes
2⅞" x 4"
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BUILDERS
MILWAUKEE, WISCONSIN

Transmissions demand a lubricant of greatest durability and cushioning qualities.

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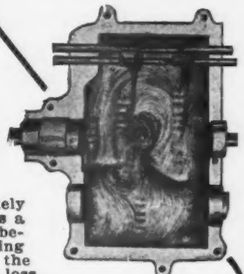

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Yields more Power with greater Economy
No Adjustments

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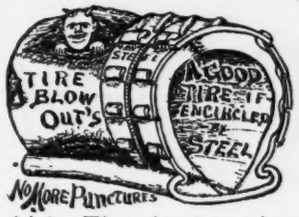

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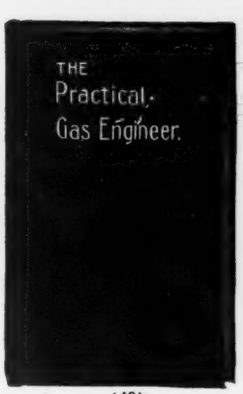

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It releases the extra pressure caused by expansion from heat or friction. County and state agents wanted everywhere. We want men who can invest $25 to fit themselves out with nickel plated pressure tank pump and safety valve, to travel and appoint agents in all parts of the U. S. Big and quick money can be made.

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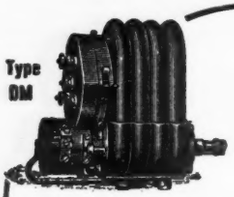

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Prime Your Engine with Prest-O-Lite to start easily

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Acetylene priming is indispensable with any method of starting, ensuring quick and easy starts in any weather. Saves the mechanism—saves your arm. The Prest-O-Primer is easily and quickly attached to any car. Write for details.

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Laxine Carbon Remover

Will keep your motor clean and double its life by using every 30 days.

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Famous for silence, power and durability

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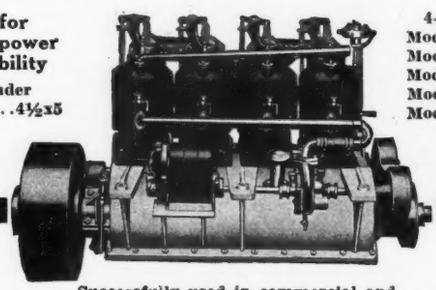

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Successfully used in commercial and pleasure cars for the past 15 years.

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Fully Equipped Garage and Machine Shop in Texas town of 10,000. Fine stand and cheap rent. Established 6 years. Now doing good business. Agency best selling car. Three counties, three sub-agents. Invoice about $6,000. Owner must sell account health. Good opportunity for the right man.

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Garage in Northern Indiana Town

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Small town, good farming community, investment required about $1500 cash. Address Box E 277, care Motor Age.

I Have a Fireproof Garage, 60x140 with three thousand dollars' worth of machinery, working five men. It is the best machine shop in a radius of two hundred miles. Will sell or lease it to good, responsible parties on easy terms. Address E. E. Roos, Box 696, Plainview, Tex.

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WANTED

WANTED—To hear from any one in Central Illinois who has a small garage and repair shop for sale or rent. Ad. Box E 272, c|o Motor Age.

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WANTED—Experienced all-around automobile mechanic and machinist to work on all makes of cars and do vulcanizing. Must be of sober habits and industrious. No other need apply. Settled married man preferred. **JOHNSON, BERGER & CO., Jonesboro, Ark.**

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Manager capable of taking complete charge of a growing auto accessory house doing a local and national mail order business direct to consumer. Must know accessory mail order business from A to Z; must be capable of selling, buying, cataloging, and in fact taking complete charge of every little detail and willing to do any part of the minor work himself whenever necessary. Only those who have held similar positions, have first class references, and are willing to give full details in first letter need answer. Bonds required. Chance of lifetime for the man who can show results. All letters strictly confidential.

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Production Manager for Automobile Factory

Man with large experience in automobile production, fully capable to handle entire production end, and get results. None but experienced men with successful record need apply. State former connections and salary.

G 1308, Kresge Building, Detroit, Mich.

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Acquainted with automobile trade, to represent a large factory making special stampings and sheet metal articles and parts on contract; must have experience in this line and must have knowledge of the mechanical end of the business, so as to be able to discuss requirements with prospective buyers intelligently; state experience and salary expected.

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50 LINCOLN MILLING MACHINES
$50 Each

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3,000 yds. silk mohair, 54" wide, by the bolt, yd	.80
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High grade cylinder oil, 100 bbls. in the lot, while they last...per gal	.16
Sold in barrel lots only, about 50 gal. in bbl.	

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You owners of Ford cars need worry no more about changing those clincher tires. Detroit's oldest department store is now marketing a new tire tool that will positively take off any clincher tire in 30 seconds, and it will replace it, too, in just that time. Will remove the worst rusted-on tire as easy as a new one. Quicker than demountable rims.

We will send it prepaid for $1.00, and after two weeks' use if you do not say it is GREAT, you may return it, and we will send back your dollar.

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Commercial Bodies
For FORD CARS—14 STYLES
Painted or in Primer.

Reduced Prices on flare board and screen panel bodies to fit Pass. cars

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Fifty Gallon Portable Gasoline Tank, Bowser, cheap. Box E 265, c|o Motor Age.

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12 styles, all sizes. Agents wanted everywhere.
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Write for prices. We have all patterns. We also make racing seats, bodies, radiator covers, etc., etc.
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New 5x6 four-cylinder, governor-controlled engine, fully equipped, with carburetor, magneto. Will sell for much less than cost. **FRED HANSON, 570 Prior Ave., St. Paul, Minn.**

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You need a strong, well built radiator these winter days.

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Buick 10	25.00
Buick 24, 25, 34, 35, 36, B24, 25	22.50
Buick 16, 17, 38, 39	31.00
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Every radiator shipped is guaranteed brand new—not a rebuilt or repaired job in our stock.
Will ship on telegram same day C. O. D.
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Cores in stock for many standard radiators such as Hupps, Warrens, Herreshoffs, Buicks, E. M. F. 30, Studebaker, Hudson 20, Cadillacs and several others.

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Every part guaranteed to be accurate. Shipment same day order is received.

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"MORE SPEED FOR THE FORD"

Special ratio differential ring gear and drive pinion for the Ford. Either 2 4/7-1 or 3-1 ratio.

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SPEED IS NOT THE ONLY FEATURE of these gears, but by preventing "Racing of the Motor" subsequent vibration and wear and tear of motor parts is eliminated.

MATERIAL USED—Nickel gear steel properly hardened and sand blasted, giving gears almost a polished appearance.

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Model 79 Overland touring bodies complete with top and wind shield, brand new.

$150 Each

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High narrow back, very comfortable. Upholstered in high grade leather. Black, red, brown or any Spanish color. Special price, $25.00. **Chicago Auto Equipment Co., 319 So. Jefferson St., Chicago, Ill.** Phone Wabash 7244.

RADIATOR — "The conservator" — Protector (pat. pend.). The only scientifically designed radiator protector on the market. Write for literature. Dealers take note. Made for all cars. Ford special, $1.50.
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Ford Model T Tubular	$16.00
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Buick 16 and 17	28.50
Buick 10	20.00
Hudson 20, 32 and 33	28.50
Chalmers 30	30.00
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Write for prices on any other makes

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to charge from A-C circuit 1 to 8 ignition, lighting or starting batteries at one time; $12 and upwards. **AMERICAN BATTERY CO., 1124 Fulton St., Chicago.**

Ship that troublesome Carburetor by Parcel Post. We rebuild and install new parts. Factory testing methods used. Service station for Schebler and Rayfield. All work guaranteed.

WILLS CARBURETOR SPECIALIST
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A FEW OF OUR BARGAINS

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SPARK PLUGS

Special 5 for $1.00, Mosler 4 for $1.00, Timesco 8 for $1.00; Bearings all $1.00 up to $5.00.

SPRING SHOCK ABSORBERS

$12.50 buys the latest in spring shock absorbers equal to the highest grade on the market selling at $35.00. Easy to install. On all good cars as regular equipment.

Hartford-Mondex shock absorbers, $5.00 each; Rims, detachable or demountable, $2.50 and $3.00 each; all makes and sizes. Storage batteries, $6.00; tool boxes, $1.00 and $2.00; raincoats, $1.90; rubber "slip-on" shirts, $2.50, clocks, $1.00 up; gas tanks, $2.50; Prest-O-Lite (genuine) tanks style B, $12.50 (complete).

LAMPS

Side oil $3.00 pair, side electric $2.00 pair, tail oil or electric $1.15, gas headlights, $5.00 pair (large), electric headlights (large) $7.00 pair; Gray & Davis large swivel searchlights $9.00 each.

RADIATORS

ALL MAKES at less than ½ price. Buick "10" $19.75; Buick 16/17 $36.00, Hudson "20" $29.00, Hudson "33" $29.00 new. Many others. Radiators repaired or traded in.

FORD

exhaust horns, $1.65; electric headlights, $6.00 pair (Gray & Davis). Special Ford Holley carburetor, $3.50. Set of 4 inclosed spring shock absorbers, $7.50; master vibrators $3.25-$4-$5.50.

Automobiles and trucks, new and used. WAR PRICES. Send for special list and say what type you are interested in.

TIMES SQUARE AUTOMOBILE COMPANY
(Largest Dealers in the World)
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RADIATORS

NEW GUARANTEED

	Tubular.	Honeycomb.
Ford T	$17.00	$19.50
Buick 10	19.75	22.50
Hudsons, 20-33	29.00	29.00
Overlands	31.00	33.00

We have radiators, both tubular and honeycomb, to fit any car. Write us for prices before buying. Send in your old radiator for repairs. We are experts. We'll make allowances on your old radiator.

WORLD'S LARGEST DEALERS

in automobiles and accessories. Send for the great

PRICE WRECKER

the money saver, covering everything pertaining to an auto.

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The Clearing House—continued.

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Cadillac tops, mohair, complete	$22.00
E. M. F. Roadster	10.00
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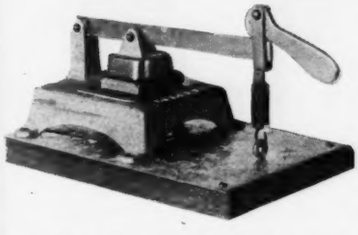
PONY VULCANIZER
For Inner Tubes



The HORSEY Pony Vulcanizer is specially made and constructed to demonstrate that **HORSEY NO-CEMENT TUBE PATCHES** can be vulcanized after applying according to directions **without** the use of any cement.

Is built on the principle of large vulcanizers.

Is the **only** small vulcanizer that has a **spring** tension on tube during vulcanizing.

Is the **only** small Vulcanizer that can be handled without danger of **burning** your **hands** and the **tube.**

Is the **only** Vulcanizer that is **heated** with **denatured** alcohol, giving a **steady,** uniform **heat** without flaring up, and is **safe** and **not dangerous** like gasoline. Denatured alcohol is sold everywhere.

Vulcanizer is 5x6 ins., and all parts nickel plated, and is mounted on 8x10 inch board protected with galvanized iron. It is the safest, the most complete, the most practical, the most perfect and the best value of any small vulcanizer sold. Will repair 90% of punctures and blowouts.

It is built on **scientific principles,** and is **indispensable** to automobile owners and garages.

HORSEY PONY VULCANIZER is packed in a substantial box with one box containing 12 assorted (large and small) **HORSEY NO-CEMENT PATCHES,** sandpaper and instruction sheets, all complete.

PRICE, $3.00

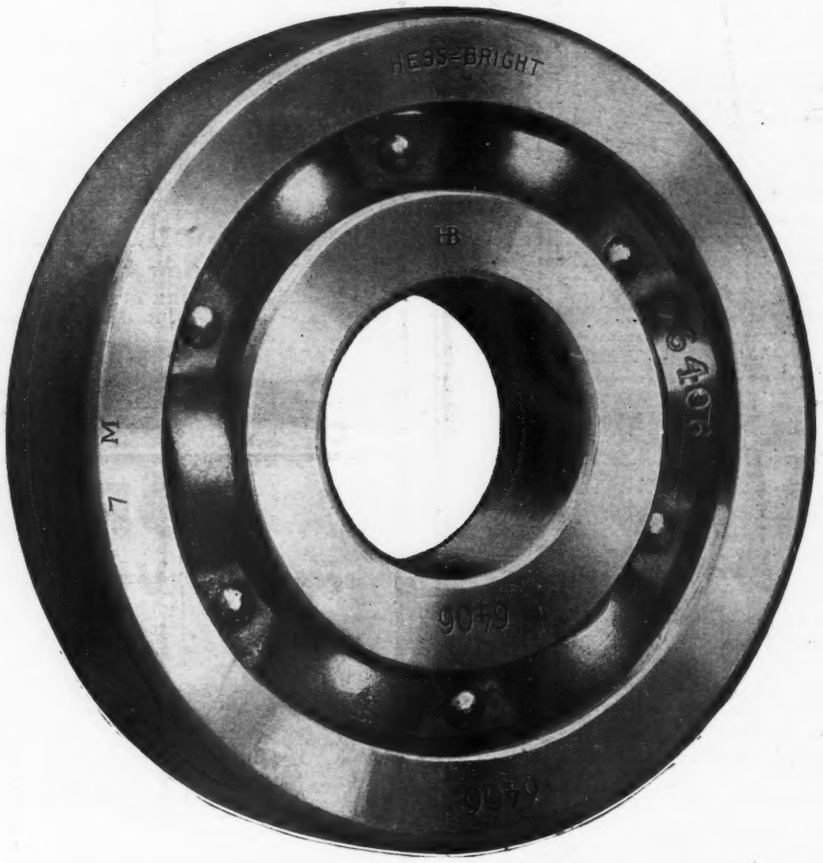
Be your own repairman with this outfit,—it is a great money saver, and you should not be without it. **Satisfaction guaranteed.**

MANUFACTURED BY
THE HORSEY MANUFACTURING CO.
6104 Euclid Avenue, Cleveland, O.

HESS-BRIGHT

HB DWF

BALL BEARINGS



The QUALITY BEARING

THE HESS-BRIGHT MFG. CO.
PHILADELPHIA PENNSYLVANIA

Without a Peer

V Ray

SPARK PLUGS

Always Everywhere $1

V-Ray spark-plugs eliminate spark-plug overhead,— Absolutely.

Do yourself and your motor — a favor. Say "V-Ray" next time

1915
Overland
Coupe
$1600
f.o.b. Toledo
Uncommon Conveniences
In the Overland Coupé you get many conveniences that are out of the ordinary.
The windows are raised and lowered by a small nickel plated handle.
It turns as easily as a door knob.
The foot pedals can be adjusted to any length or angle.
The electric starting buttons are on the steering column. Without bending or stooping you can start, stop and light the car.
On the steering column is a lock. Turn the key in this and no one can meddle with the controls or drive the car.
You should have one of these beautiful Coupés *now*.
We can make immediate deliveries.
Catalogue on request. Please address Dept. 46.
The Willys-Overland Company
Toledo, Ohio